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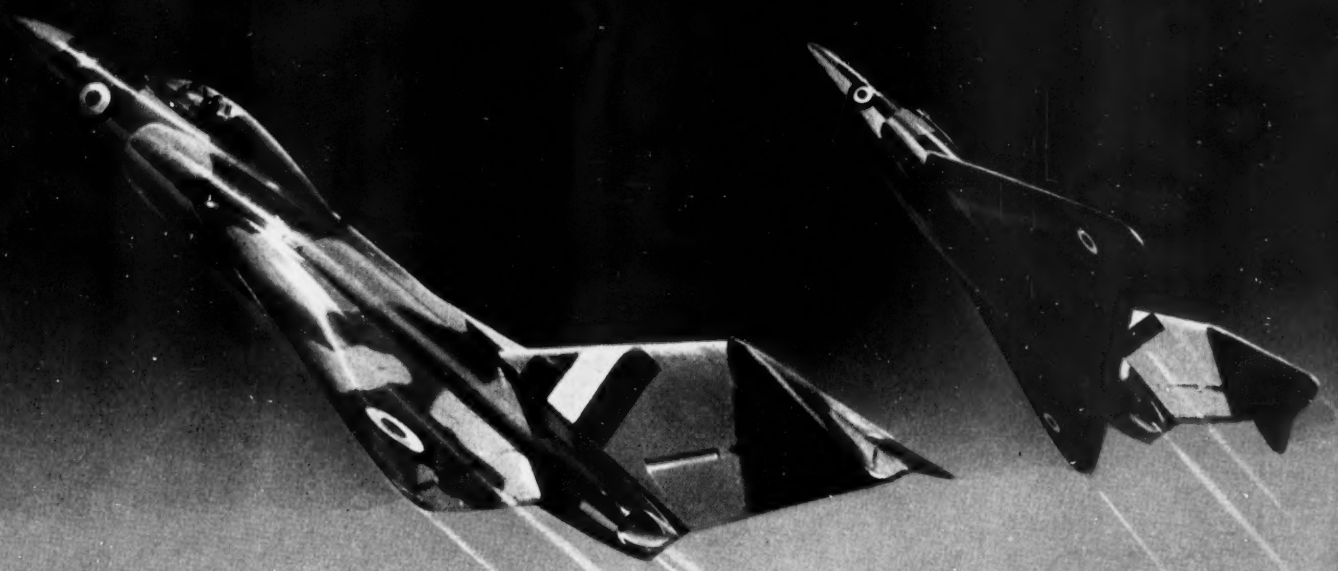

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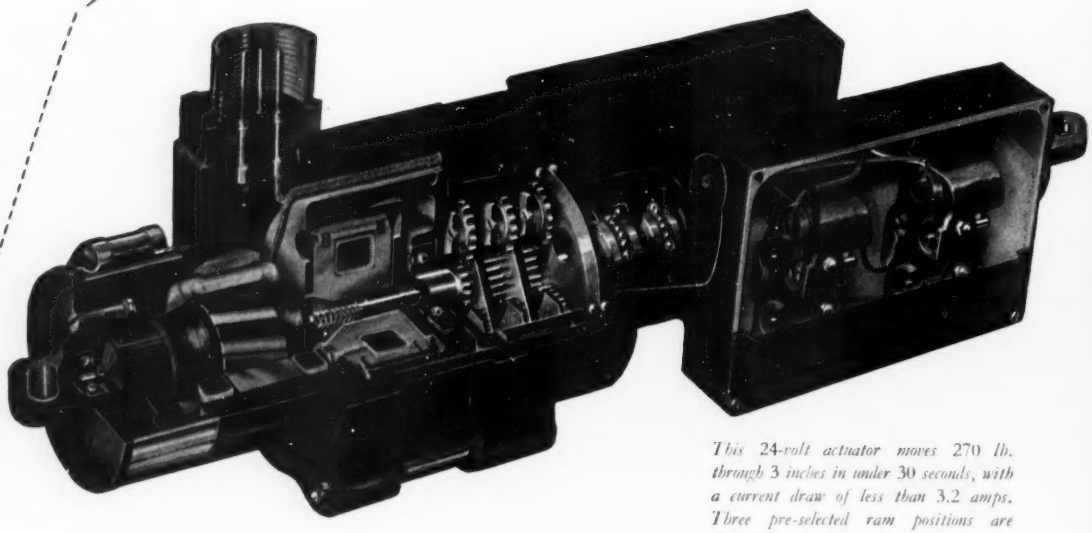

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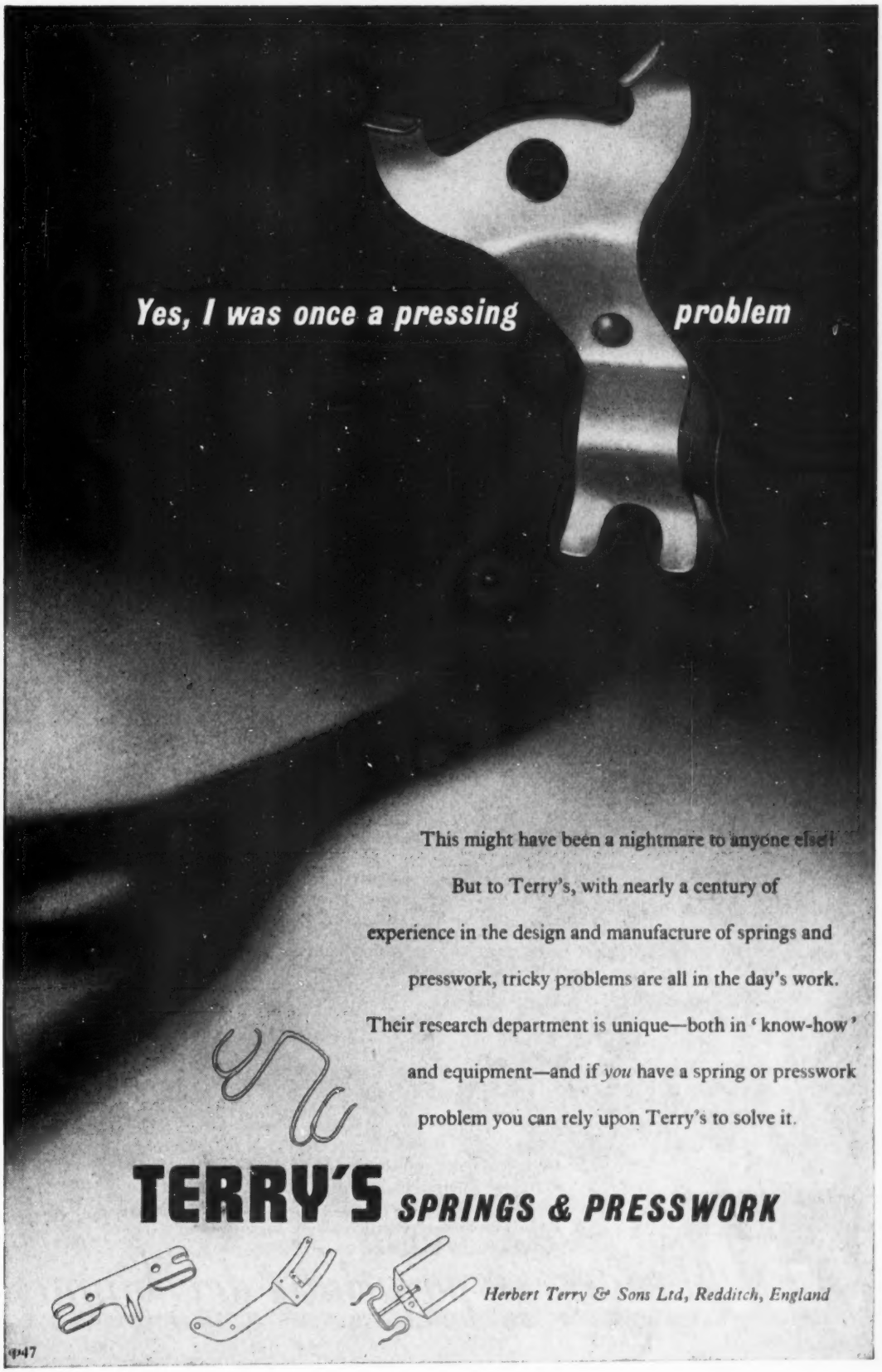
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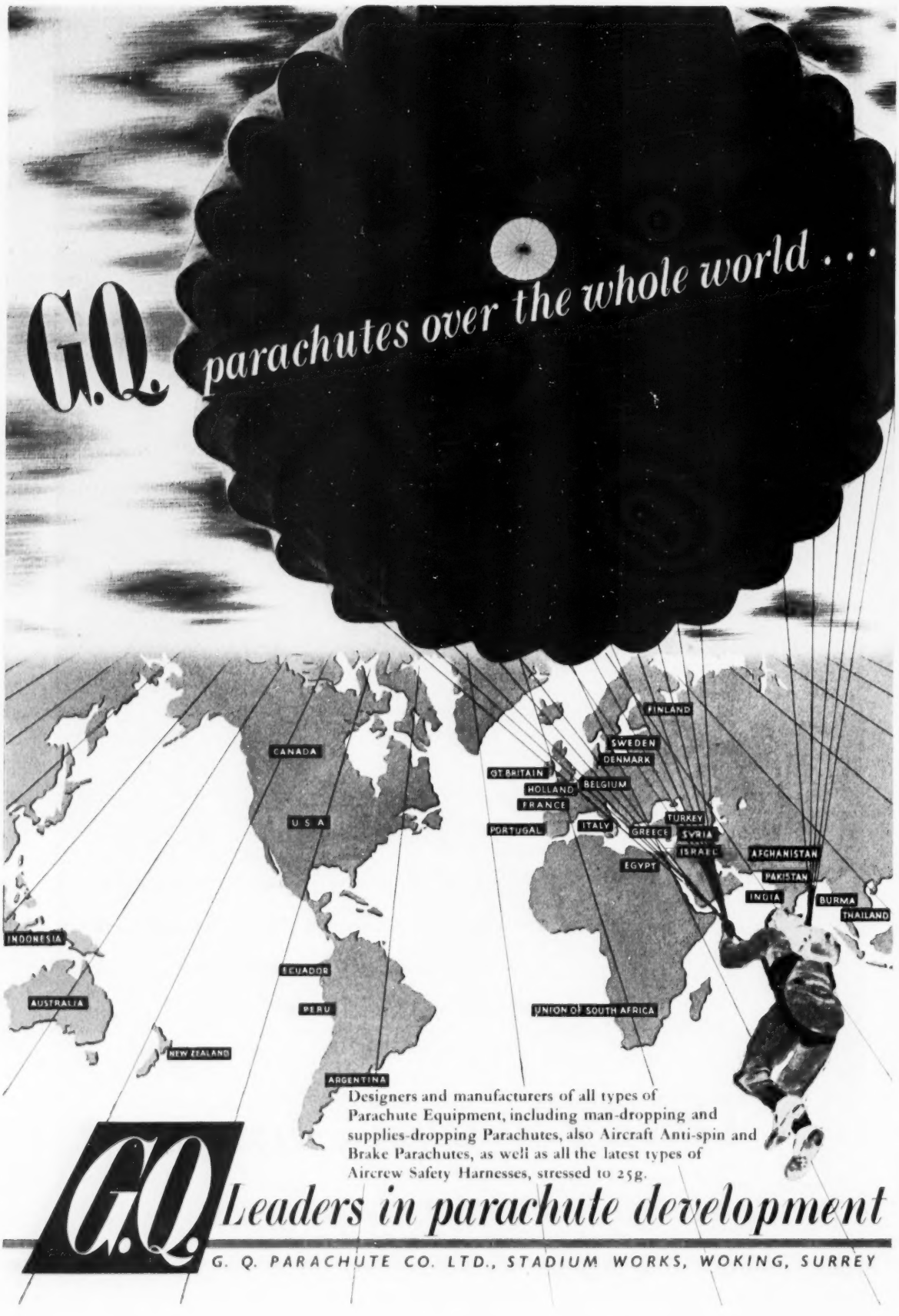

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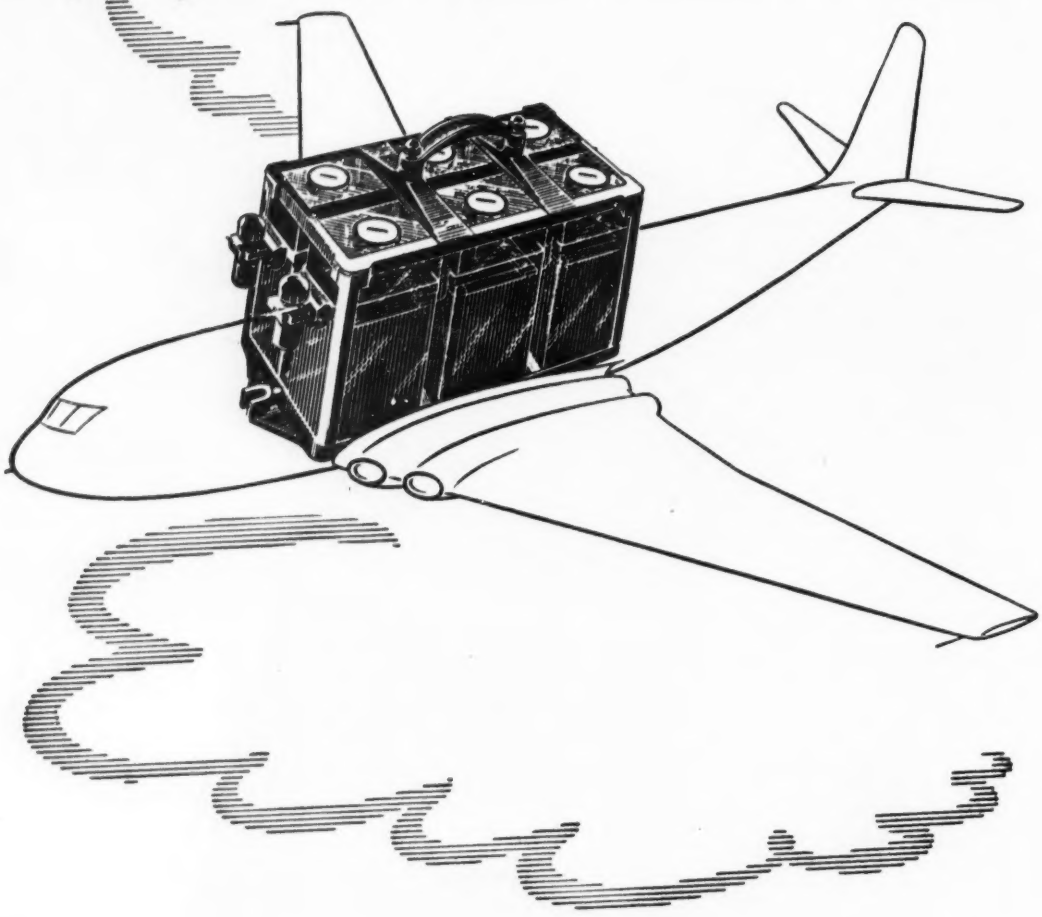

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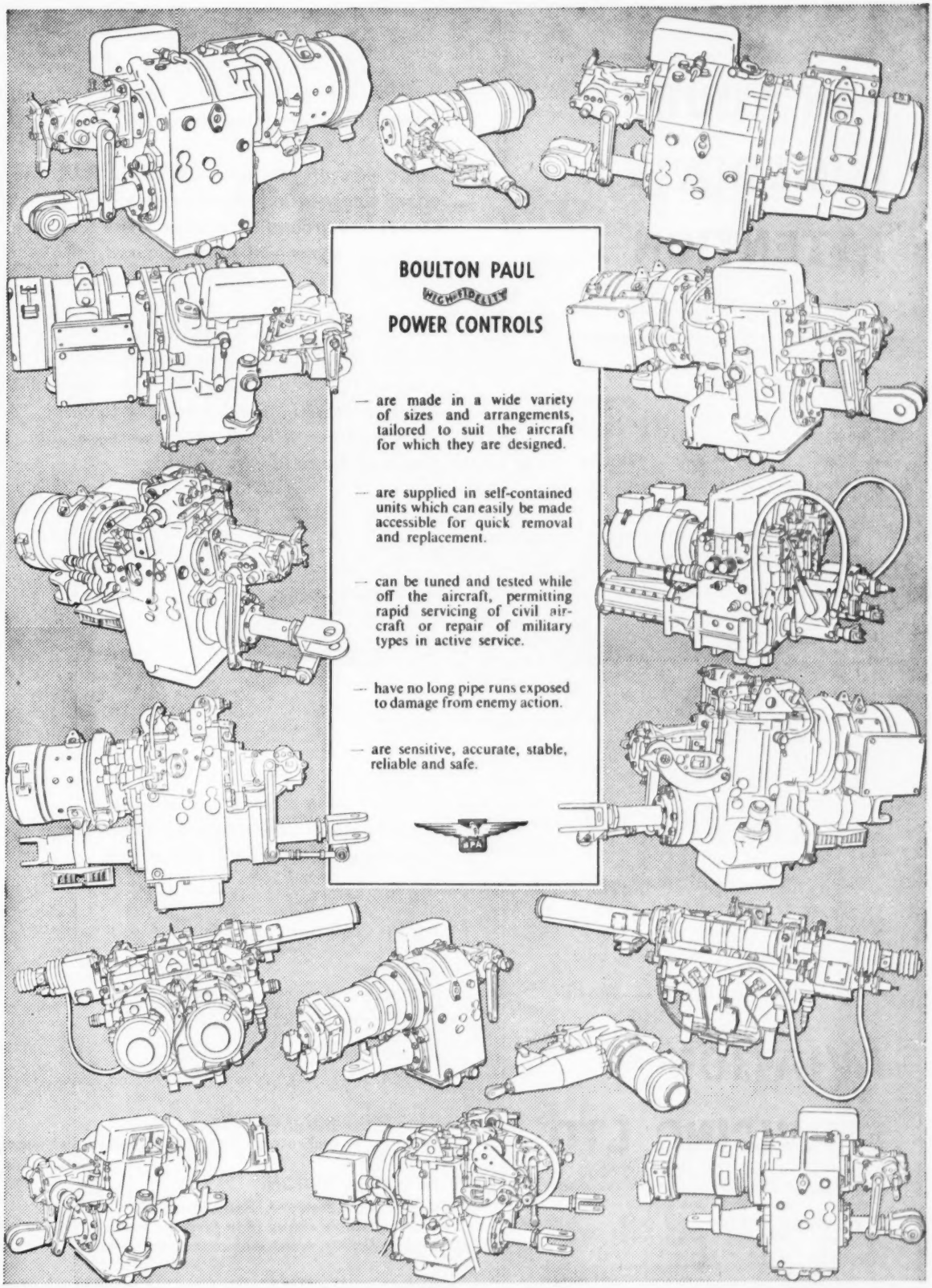
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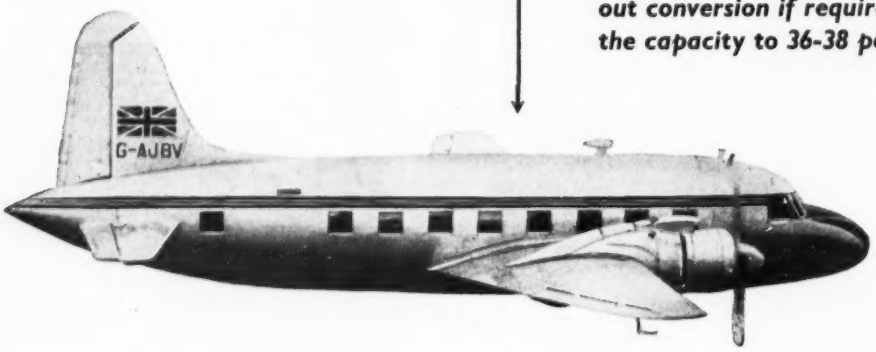

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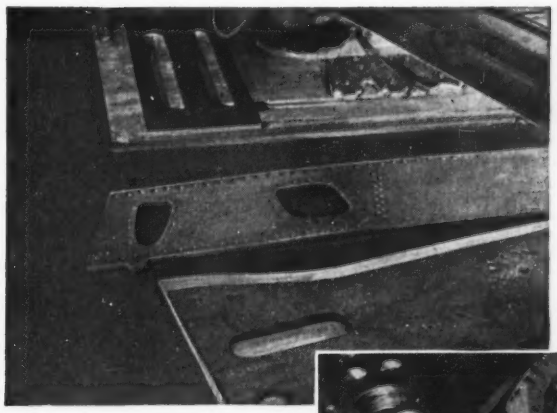

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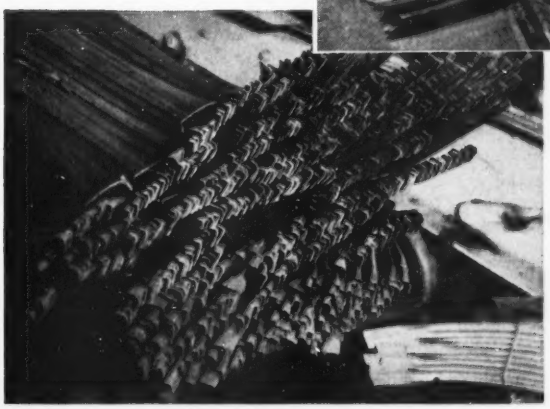

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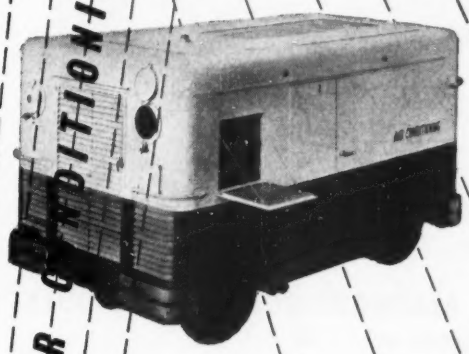

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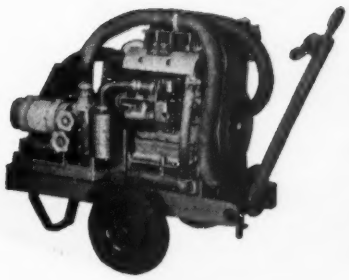

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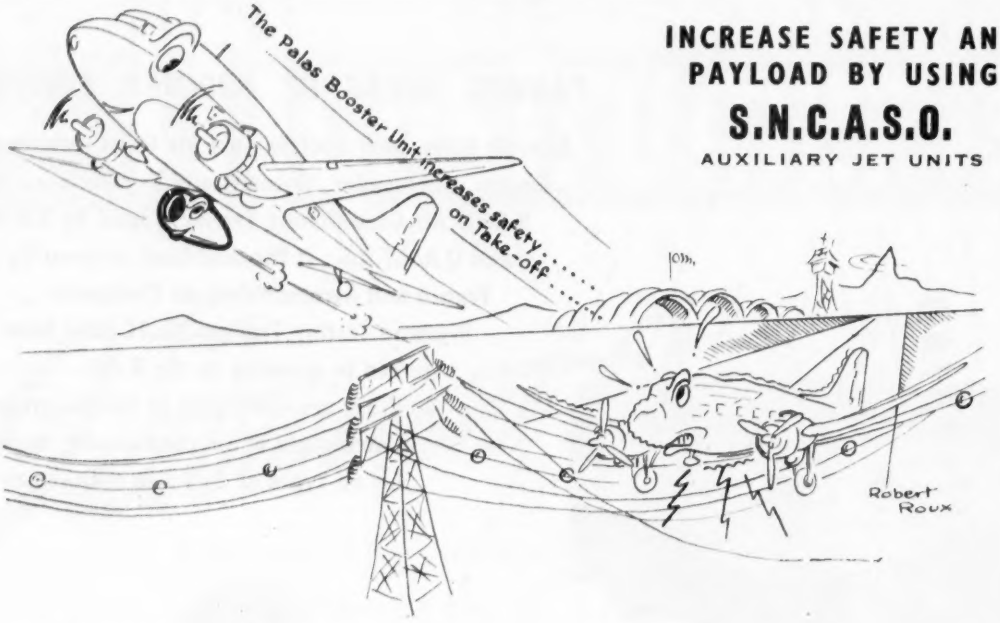

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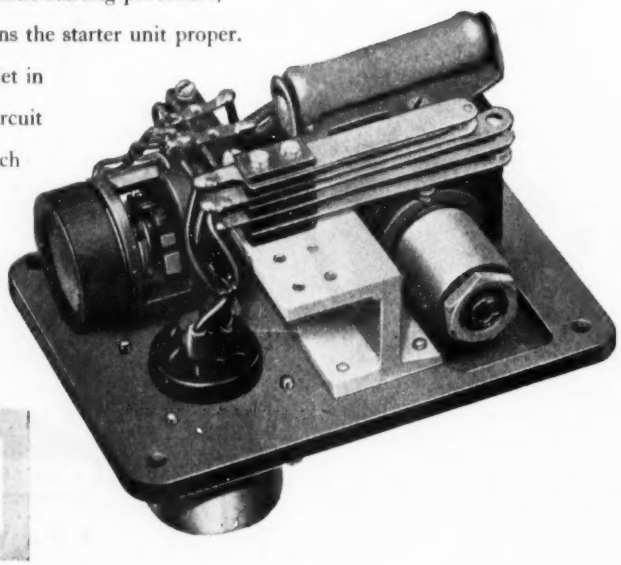

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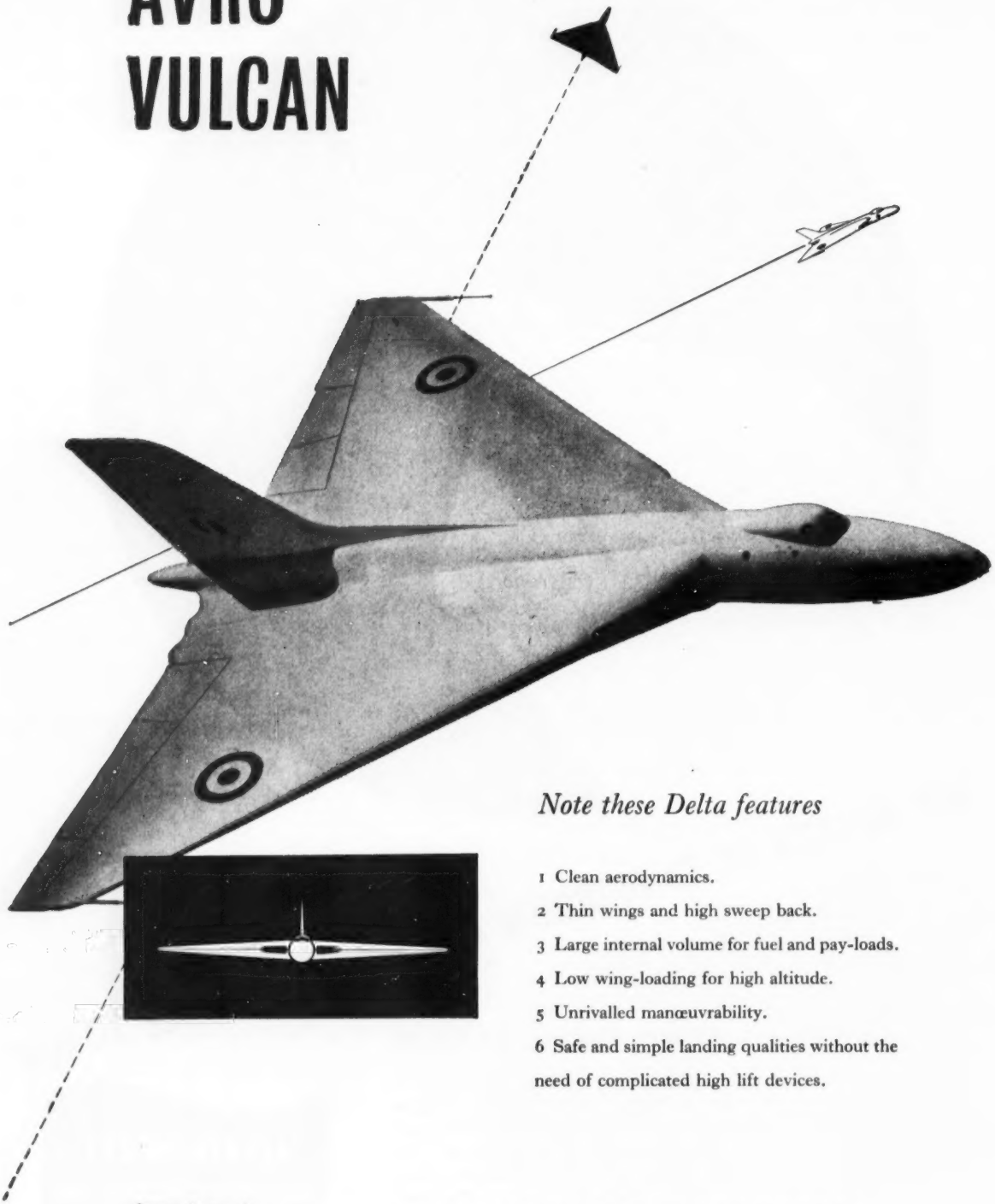

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A Matter of Perspective

THE thoughts underlying this leading article have been forming in our minds for some time past. The question now arises as to whether their expression is timely in view of the tragic news of the loss of a Comet, with all on board, during a storm over India. We believe the answer to be yes; to think otherwise would make us guilty of the very lack of perspective to which we shall be referring.

More than most races, the British general public is apprehensive about "flying." These are hard words, but ones which we believe to be perfectly true. One inherent cause is probably the fact that because air travel in the British Isles has had to grow up in competition with particularly well-established and elaborate ground transport systems (which would be referred to as conventional), it has always been regarded as something "new-fangled," to be indulged in by not entirely normal people. Very different is the attitude of the natives of wild or undeveloped countries who welcome an aircraft as a new means of transport and an attractive alternative to donkeys or their own two feet.

But in spite of the conditions which ruled in Great Britain when the public were first offered air transportation, it is more difficult to find an explanation for the continued outlook of so many of our population who remain determined, it seems, to keep both feet firmly on the ground. It cannot in every case be the high cost of flying; it may perhaps be the constant association of aircraft with a variety of dangers—an attitude of mind too often fostered by a sensational daily Press whose aim it should be to inform the public as well as (if it must) to cater for morbid tastes. Here, however, we must interpolate the remark that the handling of last weekend's cruel news from Calcutta, by the London papers at any rate, was generally restrained and reasonable. Typical of their editorial comment was this observation in the *Daily Express*: ". . . Sir Miles Thomas, chairman of B.O.A.C., has unhesitatingly announced that the Comet services will continue without interruption. It is certain that his decision was not based on expediency. It was based on knowledge and confidence. . . ." Several other newspapers expressed similar sentiments, some quoting the Comets' fine record, which includes almost 105 million passenger-miles safely flown.

But there is another aspect: can we hope for a decrease in the amount of attention devoted to incidental interruptions of airline schedules and to normal airfield precautions: fire-engines and ambulances *always* stand by. An impression has undoubtedly been created in some quarters that air travel is a "dicey," haphazard business, and that the traveller who reaches his destination safely and punctually is indeed a lucky man. That well over 40 million people travelled uneventfully on the world's airlines last year is news worthy of a headline, yet the public have not had the fact brought home to them.

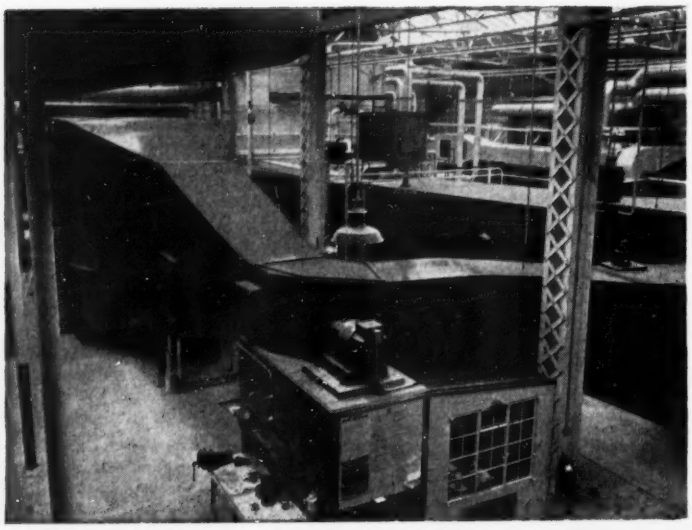
Late last year one of the most widely read dailies reported that a B.O.A.C. Stratocruiser, carrying a Commonwealth Prime Minister, "jettisoned its cargo" after diverting from Gander to Sydney, Nova Scotia, where it "circled for nearly an hour before landing with an eggcupful of petrol left." In fact, the "eggcupful" was about 850 gallons, the cargo was not jettisoned and the aircraft did not circle Sydney at all.

Again, a current B.B.C. television serial has probably persuaded hundreds of potential passengers never to set foot in an aircraft. In one instalment, the hero is seen arriving at Northolt, where he waits for an interminable time in a rather inhospitable room with a collection of other passengers. The time appears to be spent chiefly in a discussion of airsickness (a malady practically unknown on main airline routes today). Eventually, the tension is relieved by an announcement telling all passengers to board their aircraft. But they are away a few minutes only; the "port engine was missing," says one knowledgeable type on return, and a second tense period ensues. Finally they do get away, and viewers see a B.E.A. Viking, in full livery, taxying away to the runway. But, alas, the Viking, with effects-department aid, crashes on take-off.

Since such accidents can and sometimes do happen, the author of a play has every right to include one in the plot. But the unfortunate fact remains that thousands of viewers who know no better have been given an utterly false impression of all phases of an air departure from London. We appreciate how difficult it would be to dramatize the fact that last year, at the large international airport concerned, airliners took-off or landed 52,921 times without a single passenger receiving so much as a scratch.

A STUDY in DISCOMFORT

Hot-and-cold Running Climate at Farnborough



Behind the scenes in the climatic research laboratory. In the foreground is the by-pass duct with coolers, dryers and electric heaters to regulate the air flowing through the main working section test room.

THE controlled precision with which man can cook, refrigerate or dampen his fellows, blowing air at them the while, has recently been markedly improved. As might perhaps be expected, this rather curious objective has been achieved at Farnborough, home of many strange activities. It should be immediately emphasized, however, that the sponsoring authority for this pursuit is not the Royal Aircraft Establishment, but is the R.A.F. Institute of Aviation Medicine—who, in fact, have very good reasons for doing such things.

The problem of the physiological effects of extremes of climate upon aircrew is no new difficulty, and is one which came into prominence in the early years of the last war. Bomber crews, flying at high altitudes over European targets, had to work in extremely cold conditions, while at the other end of the scale it was found that cabin temperatures of aircraft in the tropics frequently rose to dangerously high levels.

Several climatic chambers, which reproduced certain climatic conditions for laboratory study, did already exist in this country and much useful knowledge was gained with their aid—yet none provided for the full, independent and accurate control of all the important climatic factors.

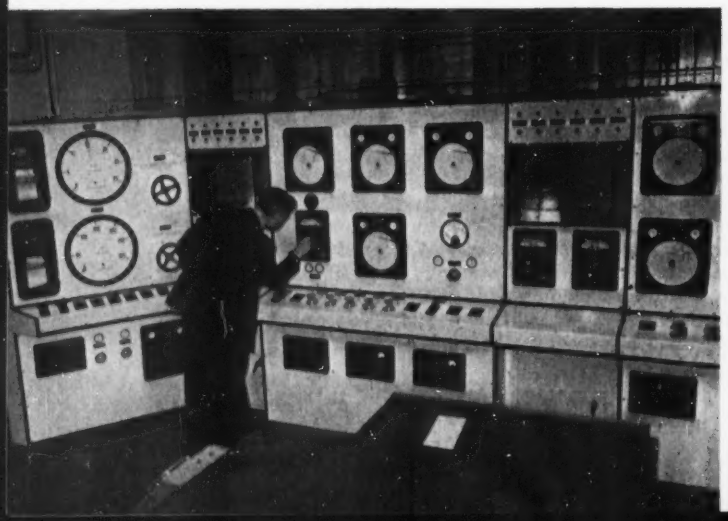
Such a chamber was therefore built. The requirements were drafted by W/C. (then S/L.) H. L. Roxburgh, O.B.E., Ph.D., B.Sc., Ch.B., and design of the laboratory to house the chamber was completed by Mr. A. H. Coombs (Air Ministry Works Directorate). The resulting unit, the subject of a recent *Flight* visit, is officially known as the Climatic Research Laboratory of the R.A.F. Institute of Aviation Medicine.

On our arrival, Dr. D. McK. Kerslake, Ph.D., M.B., B.S., head of the unit, escorted us over the laboratory, beginning with the observation room for the main climatic research chamber. We were surprised to note that the control panel appeared very similar to that of a wind tunnel; but then Dr. Kerslake explained that what was controlled did, in fact, happen to be a wind tunnel, the working section of which comprised the climatic research room. A steady low-speed airflow, it seemed, gave a more precisely controlled set of conditions than was possible in a normal isolated chamber.

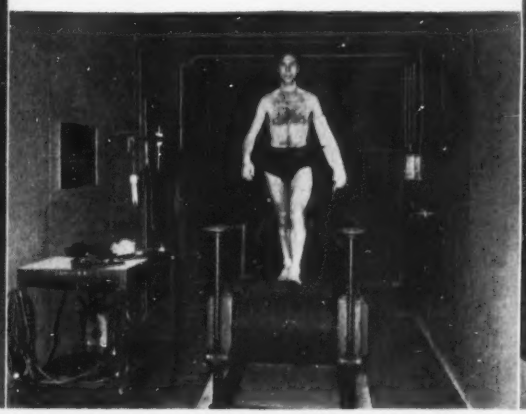
The speed of the air through the tunnel, however, was only one of the variables, for other intriguing controls and indicators referred to its temperature and humidity, to ventilation, sun effect, and to rain.

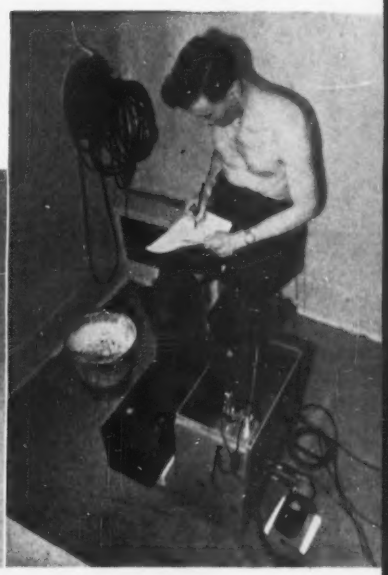
Impressed by this example of man's control over natural forces, we followed Dr. Kerslake into the tunnel, to be hit by an oppressively hot and damp atmosphere—the moist air causing a condensation film to form instantly on one's scribbling pen, as it duly recorded "130 deg F, 45 per cent relative humidity."

In addition to the temperature of the airflow, that of the floor and walls and ceiling of the 9ft x 9ft x 15ft test chamber are separately controllable. Six banks of infra-red lamps set behind a glass ceiling-panel give some 500 B.Th.U. of radiant heat per sq ft per hr, while a cross of water sprinklers provides up to 5in of rain per hr. At one end of the chamber is the fan providing the airflow; in the test section itself were (at the time of our visit) an endless belt and two pilots' seats, for use in perspiration and flying clothing



(Right) The unknown physiological prisoner stands immersed shoulder-high in the elongated dustbin that is the bath calorimeter, as Mr. H. Lundy checks the automatically recorded temperatures. (Below) Mr. F. Seymour, engineer-in-charge, at the wind tunnel control panel. Here, wind velocity, temperature, humidity, sun and rain effects are adjusted, and observations made through the two glass panels into the chamber.





In the interests of science, the medical staff act as their own victims. (Left) Testing flying clothing at 120 deg F, 45 per cent humidity; (centre) the long, long road in the search for perspiration; (right) hot- and cold-water tanks are used to confuse the feet and to study perspiration from the sole.

tests respectively; and at the far end were the vertical corner-vanes, as the tunnel turned a right-angled bend.

Passing between the vanes, we entered the tunnel-section used as an auxiliary room providing sleeping or living space during prolonged tests. Here, the air temperature, humidity and wind velocity can be maintained, but there is no heating of wall, floor or ceiling. For psychological reasons, insulated windows, in line with those in the building's outer wall, are provided.

Leaving the tunnel we entered an adjacent air-conditioned room, used for tunnel acclimatisation, transfer experiments and other work. Temperature, humidity and ventilation can be controlled in this room where, on the occasion of our visit, the conduction of perspiration from the soles of the feet was being studied. The feet, incidentally, belonged to a member of the unit's medical staff—as limbs under investigation normally do.

The "metabolism room," used for body-heat studies not requiring the full wind-tunnel facilities, was the next to be visited. It provided the sight of a most alarming piece of equipment; a tall cylinder known as the bath calorimeter.

The human subject, before and after exposure to the cold test conditions while wearing protective clothing, strips and enters the calorimeter, inside which he is immersed in warm water up to his shoulders. His body temperature is measured by small resistance-thermometers in the stomach and the œsophagus (by means of a modified Ryles tube) and in another most improbable place. Water temperature is similarly measured and recorded.

Head of the climatic research laboratory, Dr. D. McK. Kerslake, Ph.D., M.B., B.S., shows the thickness of the insulating door leading into the wind tunnel test room.

The amounts of heat taken up by the body from the water, before and after the exposure, provide a measure of the effectiveness of the protective clothing worn. Mr. H. Lundy, B.Sc., assistant physiologist to Dr. Kerslake, in explaining the principle, pointed out that the method was still being developed and refined.

Putting aside the thoughts of school physics experiments in which one obtained the specific heat of a rubber stopper, we continued into the laboratory kitchen. Diet study is an important feature of the work, in connection with the provision of survival food-packs, the contents of which obviously depend on the type of climate envisaged. Also included in the laboratory are the clothes conditioning and clothes drying rooms, for investigation of the thermal properties of clothing.

By far the greater part of the building which houses the climatic laboratory is occupied by the various components of the wind tunnel itself and the air-conditioning plant, and of this side of the installation we heard from Mr. F. Seymour, engineer in charge. The tunnel is of the single closed-return type, the climatic test chamber lying just upstream of the fan. By varying the speed of the 110-h.p. fan-driving electric motor, the wind speed is adjustable from 30ft per min to 2,640ft per min (a maximum of 30 m.p.h.) with an accuracy of plus or minus 1 per cent. Processing of the tunnel air to obtain the required climatic conditions is performed in a by-pass loop through which part of the tunnel air is drawn.

The loop contains coolers, dryers and electric heaters, the coolers being paired so that the automatic defrosting of a cooler need not interrupt the operation of the tunnel. Downstream of the bypass loop, steam is injected into the main airflow to give the appropriate humidity, while inside the main tunnel circuit is situated the plant for the control of the auxiliary rooms.

Air Temperature range in the test chamber of the tunnel is from 15 deg to 180 deg F; surface temperatures are between −5 deg and 200 deg F (both accurate to plus or minus 0.5 deg). The test-room surfaces are of metal, behind which brine circulates at the appropriate temperature.

The climatic unit's work consists broadly of:

(a) General climatic problems, such as the maximum permissible temperature for the performance of given work.

(b) Investigations requiring very accurate control of conditions, such as the control of body temperature.

(c) Work in fields not strictly climatic but in which control of environment is important, such as survival requirements.

To carry out this work, Dr. Kerslake has a laboratory medical staff of eight, consisting of Service and civilian experts in physiology and associated subjects. Obtaining first-hand experience of the physical problems of squadron aircrew at home and overseas are the Institute's "flying doctors," qualified both medically and as pilots, who often bring new problems to the attention of the climatic laboratory.

This teamwork, performed quietly, efficiently and continuously as a background to the R.A.F.'s flying operations, has as its object the reduction of physical discomfort of aircrew due to climatic extremes. In this, the new laboratary will prove of great use. We look forward with interest to its future developments, and with trepidation to the even worse tortures to be inflicted by its staff upon themselves.

Physical discomfort is clearly here to stay—for some.

K.T.O.

FROM ALL QUARTERS

Wings for the Duke of Edinburgh

CONFIRMATION of the good progress which had been made by the Duke of Edinburgh with his course of flying was given when he made three faultless circuits and landings—we saw them ourselves—in his five-star Harvard KF725 at White Waltham airfield last Monday. In the afternoon, at Buckingham Palace, he received his "wings" from the Chief of the Air Staff, A.V-M. Sir William Dickson.

Since he started his course of instruction last November 12th, the Duke has followed through the normal R.A.F. flying training syllabus, including instrument flying, Link and ground subjects. F/L. C. L. Gordon, his instructor, told us that, taking into consideration all the headings under which a normal Service pilot is judged, and particularly flying skill and enthusiasm for flying, he would classify the Duke as "exceptional."

Experience to date has been almost entirely on the Chipmunk and then on the Harvard; but, in addition, a start has already been made on twin-engined flying in an Oxford (selected as being one of the more difficult light twins to fly and therefore offering good experience and training for any other twin that the Duke may decide to fly in the future). It is understood that part of the syllabus of applied flying has been slightly modified to suit the Duke's requirements in the future—for it has been made clear that the course of instruction of some 90 hours up to "wings" standard is only the beginning.

Some of the training which the Duke of Edinburgh received with the Navy has been a help to him in his flying. Navigation is an example and, because of the need (in spite of his many commitments and the effects of spells of bad weather) to achieve some continuity of training since last autumn, he has flown to and from several airfields such as Smith's Lawn, West Raynham and Bircham Newton. Instruction in instrument flying has mainly taken place in the air and has included practice of procedures and G.C.A. at Farnborough and West Raynham.

The Duke completed his basic Chipmunk flying on February 15th and made a first solo in the Harvard at White Waltham about a week later. On April 7th he made a 120-mile triangular cross-country, and two days later, after some preliminary practice in formation flying, he made a 240-mile cross-country, refuelling at R.A.F. Station Tangmere. The Duke's final handling test was conducted by the Home Command Examining Unit on April 13th. During the 1¼ hr of the test his piloting inspired confidence and his sense of airmanship and aircraft safety were judged well above average. His knowledge of procedures was good and showed that he had given considerable thought to his flying.

$100,000 Must Be Won?

THE American offer to award $100,000 to the first Communist pilot to land a Mig-15 behind the Allied lines in Korea has stirred up criticism from at least two very different quarters. In the House of Commons, comment was made both on the moral issues involved and on the alleged poor timing of the offer. Apparently there was no prior consultation with the British Government in the matter, and Labour members claimed that to make such a gesture whilst truce talks were proceeding at Panmunjon might seriously prejudice the prospect of an armistice. Sir Winston Churchill, in reply, stated that, as America was "bearing nineteen-twentieths of the weight of the Korean war," there was no reason why she should be expected to refer every decision to all the other countries involved.

A more personal criticism came from Franciszek Jarecki, the Polish pilot who recently landed a Mig-15 in Denmark. He, too, complained that he had not been consulted in the matter, although the leaflets which had been dropped behind the Communist lines in Korea contained his photograph. He claimed that this had further endangered his life, and in any event he doubted if the idea itself was tactically correct. Jarecki is now in America.

Rhodesia's Big Air Show

FURTHER details have now reached this country concerning the big air display to be held at Salisbury Airport, Southern Rhodesia, on the occasion of the centenary of the birth of Cecil John Rhodes. Over 450 clubs and private owners in the Rhodesias, South Africa and East Africa have been invited to take part in events which will include a closed-circuit handicap race, an inter-club pylon race, an aerobatic competition and an arrival competition. The 11 airlines operating over and through Central Africa have also been invited to attend, and Service units will include those of the Southern Rhodesia Air Force, the South Africa Air Force, and the R.A.F. It is understood in London that a squadron of Venoms from 2nd T.A.F., and a Canberra, are probable R.A.F. representatives.

The majority of aircraft will arrive on Friday, June 12th, and a centenary air ball will be held in the evening. A static show opens on the morning of June 13th when, also, the airlines will give flights, the light aircraft contests will be held, and the main flying display by Service aircraft will take place. All participants will be the guests of the Salisbury City Council at a civic cocktail party in the evening. A similar programme is scheduled for June 14th.

H.R.H. THE DUKE OF EDINBURGH in the cockpit of the Harvard on which he obtained his "wings." Note the five stars signifying the seniority of the owner of the aircraft.

Special Trials for the S.A.4

THE second prototype of the S.A.4. has been delivered to the Ministry of Supply by Short Brothers and Harland, Ltd., and is to undertake a programme of special trials for the development of some of this country's latest secret equipment. It first flew in August, 1952, and since then has been carrying out extensive test flying. The first S.A.4, which made its maiden flight a year ago, is also about to undertake the testing of new equipment.

Goodyear Trophy Entries

TWENTY entries have been received for the Goodyear Trophy Race to be held at the Municipal Airport, Wolverhampton, on Saturday, May 16th. The first of the season, the race is one in which performances will count towards the Royal Aero Club's 1953 Air Racing Championship and among the entrants is last year's champion, Pat Fillingham, flying the de Havilland Company's demonstration Chipmunk. Other entrants include Throttlebenders Paine, Somers (Mew Gull), Rush and Dunkerley (M.28), and Miss Lettice Curtis (who has been with the Fairey flight development department at White Waltham since last March).

The Air League Jubilee Ball

OVER 400 guests, including most of the leading personalities in Service and civil aviation, attended the Aviation Jubilee Ball organized by the Air League of the British Empire to commemorate the 50th year of aviation, and in aid of the Air League funds. The ball was held at the Dorchester Hotel, London, on April 28th.

The guest of honour was the Secretary of State for Air, Lord De L'Isle and Dudley, who was accompanied by Lady De L'Isle and Dudley, and the Chief of the Air Staff, Air Chief Marshal Sir William Dickson, with Lady Dickson, were among those who brought parties. Naval Aviation was represented by Vice-Admiral E. W. Anstice, the Fifth Sea Lord, representing the First Sea Lord, who was prevented by a Service commitment from attending, and Gen. F. H. Griswold, Commanding General of the 3rd United States Air Force, and Gen. J. C. Selser, Commanding General of the 7th Air Division, who had been called away at short notice, were represented respectively by Col. G. F. McGuire and Col. Jack Roberts.

During the evening the Secretary of State for Air read telegrams

which had been exchanged between Air Chief Marshal Sir Guy Garrod (chairman of the Council of the Air League) and General Doolittle, who is the chairman of the Committee which is organizing the U.S.A. celebrations of the 50th year of powered flight.

After the dinner which preceded the ball, Marshal of the Royal Air Force Sir John Salmond made a brief speech in which he commented on the amazing advances in aviation since the historic flight by Orville Wright 50 years ago. In this high-speed pageant of aviation progress, he said, men and women of all nations had played their part; but it was all begun by two Americans, and it was an American achievement that they were celebrating that night. After naming the U.S.A.F. representatives who were present, Sir John concluded by inviting the company "to drink to the memory of Orville and Wilbur Wright, and to all the pioneers who have carried forward the work that they began."

A Derry and Richards Memorial

IN memory of John Derry and Anthony Richards, who lost their lives in the Farnborough accident last September, a memorial medal is being struck by the Guild of Air Pilots and Air Navigators. It has been established by the members of the de Havilland organization, and its award is being administered by the Guild.

It is the intention to make the award available, from 1954 onwards, "to a pilot, not on active service in Her Majesty's regular forces, but professionally engaged in flying for the testing or development of British aircraft, whose flying over a period of time, including the previous year, has been of outstanding value to the advancement of the science of aviation."

Demonstration at Woomera

THE joint British/Australian Long-Range Weapons Establishment at Woomera, 230 miles from Adelaide, has been the site of a great deal of very valuable pioneer work during the past six years. It is, therefore, gratifying to be able to report on three lines of development, each of which is now sufficiently perfected to have been publicly demonstrated.

Although Australia goes to the polls tomorrow to elect a new Senate, the Prime Minister, Mr. Robert Menzies, broke his election campaign last Saturday, May 2nd, to visit the Establishment. With him were Sir Philip McBride, Defence Minister; Mr. Howard Beale, Minister of Supply; Sir Stephen Holmes, United Kingdom High Commissioner; leading defence and supply personnel; and members of a Service mission from the U.S.A.

The first demonstration concerned the Jindivik. This pilotless aircraft (which was described in *Flight* of April 25th, 1952), has been developed from the Pika piloted prototype which was used to perfect aerodynamics and control system of the design. The first Pika flew in October, 1950, and two have since logged nearly 100 hours. The Jindivik differs from the Pika in that the Armstrong Siddeley Adder turbojet is aspirated from a dorsal intake, the cockpit is replaced by a bay housing radio-guiding receivers and the tailwheel-type undercarriage is replaced by a launching trolley and belly skid. Both aircraft have been developed by the Australian Government Aircraft Factory to M.o.S. specification.

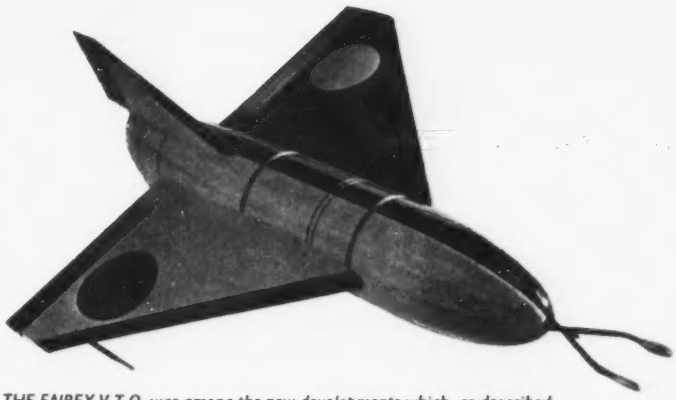
After launching from its trolley the Jindivik is under the control of a small radio station—or, as the Americans have it, a "beep box." In the test on May 2nd, the control station was airborne in a Meteor T.7, and was manipulated by the occupant of the rear seat. Together, the Meteor and its tiny (23ft by 19ft) slave were airborne about a quarter of an hour, the Jindivik flashing white against a cloudless sky. After guidance on the approach, from the Meteor director, the Jindivik's own gyro-stabilizers took over as it slid to a halt on its skid.

The Jindivik is to be variously used as a target for guided weapons or as a missile itself—with, it is reported, an atomic warhead. Much of its guidance system was developed by the R.A.E. and the British instrument and electronics industry.

Production of 12 Jindivik Is will be followed by large-scale output of the Mark 2, four prototypes of which are to begin their tests this summer. The Jindivik 2 has the much smaller, lighter and more powerful Armstrong Siddeley Viper, and may be supersonic. A large American order for Jindivik 2s is rumoured.

Rocket Test Vehicle I was the next item in the demonstration programme. As its name implies, this is not a prototype of any particular weapon but is a basic research tool which has been made in large quantities. RTV-1 figured in a Ministry of Supply release, reported in *Flight* of Aug. 1st, 1952. It has a streamlined cylindrical body with very short wings and two pairs of cruciform control vanes. A very similar vehicle was shown by the M.o.S. at Farnborough last year and was illustrated on p.363 of our issue for September 12th last. In-flight power comes from a large central rocket; four solid fuel boosters are provided to impart very high initial acceleration. Length and weight—presumably with boosters—are given as 22ft and 600 lb. and the maximum speed is variously quoted as 1,500 and 3,000 m.p.h.

According to a *Daily Mail* correspondent, the RTV-1 "shot up, trailing a white vapour arc like a magnesium flare. It was 10,000ft high before the roar of its firing was heard." Full flight data were telemetered back to the ground, while ground visual, camera and radio observation was also kept. The present vehicle is stated to have a short range, and to be recoverable by parachute. The boosters, which fall away as their thrust dies, are expendable.



THE FAIREY V.T.O. was among the new developments which, as described on this page, Mr. Menzies inspected during his visit to Woomera.

The third development shown was a vertical take-off delta-wing aircraft, by the Fairey Aviation Company. This resembles the orange-painted aircraft shown at Farnborough last year. Each wing has a large aileron and the vertical fin carries a large rudder. But vertical take-off with low acceleration—as developed by Fairey, obviously with piloted flight in view—imposes control problems which cannot be solved by the use of normal aerodynamic surfaces. The German V-2 used carbon vanes actually in the rocket efflux; the Fairey Beta I rocket (*Flight*, December 21st, 1950) has two jets, one of which can be swivelled laterally and the other vertically, according to signals from an autopilot. The resulting mean thrust line can thus be varied to maintain controlled flight at low airspeeds. Faireys have carried out many successful tests with this auto-controlled research aircraft, the first of which was from a ship in Cardigan Bay in 1949. The Fairey V.T.O. obtains 900 lb thrust from each Beta nozzle and, for launching, uses two solid-fuel boosters of 600 lb each, bringing the total thrust up to 3,000 lb—obviously more than the total weight.

Mr. Menzies and his party also saw films and models of operational guided weapons. Since 1950, 440 guided missiles of various kinds, together with 700 rockets, have been fired at Woomera. A further 2,200 bombs have been dropped and present tests of ground-to-ground, ground-to-air and air-to-ground weapons are stated to be almost continuous. One of Woomera's most important commitments is known to be development of the guided bomb, for which Bomber Command—and Sir Hugh Lloyd in particular—have waited expectantly.

W/C. Stanford Tuck for English Electric

APPOINTED sales manager of the Marconi aeronautical division earlier this year, W/C. R. Stanford-Tuck, D.S.O., D.F.C. and two Bars, American D.F.C., has been released to join the aircraft division of the English Electric Co., Ltd., parent company of the group of which Marconi's is a member. He now goes to Warton Airfield, near Preston, Lancs, where he will work directly under A. Cdre. Strang Graham, of English Electric.

W/C. Stanford-Tuck, who joined Marconi's in 1949, was one of the best-known Battle of Britain pilots, having destroyed no fewer than 29 enemy aircraft. Twice he baled out and was taken prisoner; in March, 1943, he took part in the famed mass escape from Stalag Luft III.

Over to Weybridge

IT was disclosed last week that W/C. Charles Gardner, the B.B.C.'s air correspondent, is to forsake broadcasting next July in order to join the aircraft division of Vickers-Armstrongs as assistant—particularly in such matters as public relations—to Mr. George Edwards.

Charles Gardner joined the Corporation in 1937, and since then—except during his war service as a Coastal Command pilot and on Lord Louis Mountbatten's staff—he has made hundreds of broadcasts, some of which (notably a Battle of Britain description in 1940) are remembered as classics of the commentator's art. He has also provided knowledgeable commentaries on the public-address systems at many air races and displays.

Not all his broadcast news subjects were directly aeronautical: sometimes he gave an airman's-eye angle on big news-stories, such as the flood disaster earlier this year—to our way of thinking, this particular effort was a masterpiece of reporting. Clearly, the B.B.C.'s loss will be Vickers' gain, though we imagine that W/C. Gardner will not forsake the microphone completely.

HERE AND THERE

RENDEZVOUS AT REDHILL: That, given some go-ahead organization and favourable weather, there is still plenty of enthusiasm for sporting flying is proved by this view of Redhill Airfield, taken after the "dawn patrol" on April 26th (see page 585).

The Provost Jet Trainer

FIRST mentioned by Mr. George Ward in the House of Commons on March 12th, the signing of an order for a jet version (A.S. Viper 2) of the Percival Provost T. Mk 1 is now confirmed by the makers. The number ordered remains undisclosed.

East German Air Strength

LATEST information on the number of East Germans now under arms—given in a recent Parliamentary answer—puts the air force figure at 6,000. There are a headquarters and three units, each equipped with about 30 Soviet trainer aircraft.

N.Z. Jet Overhaul

MAJOR overhaul and testing of R.N.Z.A.F. Goblin engines by the Australian de Havilland company will soon be undertaken at Milson Aerodrome, near Palmerston North, in the North Island. A contract has been let for the construction of a test house, to be completed in June or July.

News from Brazil

RECENT news from Brazil states that the Galeao National Aircraft Factory, Rio de Janeiro, is to build 70 Piper-type trainers for distribution to flying clubs; that two German firms are negotiating for the establishment of aircraft factories in Brazil; and that Rolls-Royce intend to install plant for the maintenance of their Derwents in service in the Meteors recently supplied to the Brazilian Air Force.

THE NEW PARACHUTE with stabilizing pockets (see above).

Coronation in Comfort

MEMBERS of the Royal Aero Club, and their guests, will be able to watch the Coronation procession on a 4ft by 3ft television screen at Londonderry House. Tickets—which include breakfast, "elevenses," and a champagne lunch—are £5 each.

Historic Log-book

THE log of Bert Hinkler's 1928 England-Australia flight in an Avro Avian was presented to the Australian High Commissioner in London last week. It was handed over by Mr. Henry Stisted, managing director of the Hampshire Aeroplane club, who a few weeks ago found it concealed in the wing of the little Hinkler Ibis monoplane, which had come to light in a barn near Southampton. Thanking Mr. Stisted, Sir Thomas said that the log would be sent to the Commonwealth National Library at Canberra.

Unconventional 'Chute

ILLUSTRATED here is a new parachute developed by Dr. H. G. Heinrich at the Wright Air Development Center, Dayton, Ohio, and shortly to be put into production by the Pioneer Parachute Co., of Manchester, Conn. It has been designed, in particular, to minimize oscillation of the kind that is responsible for so many landing injuries to parachutists, and to this end every second gore of the canopy is provided with a "guide extension"—a small pocket or sleeve which, under air pressure, extends outward and creates turbulence that tends to steady the canopy. It is claimed, also, that the extensions provide drag which reduces the rate of descent to 19.6 ft/sec. It is stated that 300 dummy and over 400 live drops have been made, at altitudes of 500ft upwards, and at up to 410 m.p.h.

Return of A.V-M. Thornton

LAST Monday evening, A.V-M. H. N. Thornton, C.B.E., sales director of Blackburn and General Aircraft, Ltd., was due to arrive back in this country from the three-month tour during which he has visited India, Thailand, Singapore, Australia, New Zealand, Japan, Honolulu, the United States and Canada.

Coincidence

WHEN Mr. Eric Cole, Ekco chairman, arrived in New York recently, he switched on the T.V. in his hotel bedroom—and was greeted by newsreel shots of the U.S. Air Navigation Development Board's tests of his own company's radar approach aid.

Fair Enough

AQUILA AIRWAYS—Britain's only flying-boat operators—are offering their passengers to Madeira, during July, August and the first half of September, a refund of their return fares (£59 10s), plus £40 expenses, if more than half an inch of rain falls during their fortnight's holiday.

Airfield For Coalfield

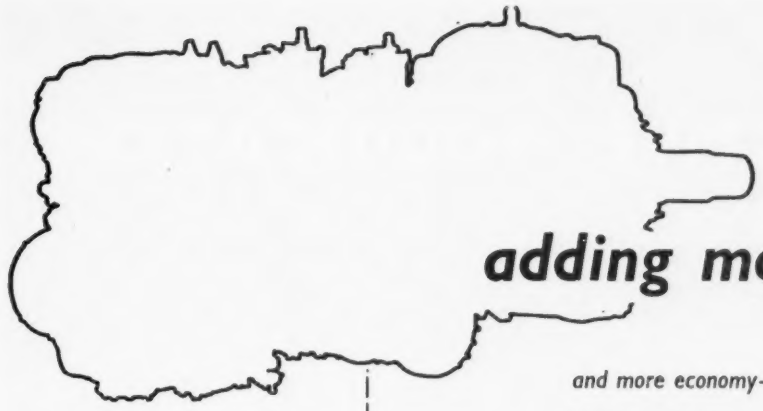
THE central Queensland port of Gladstone, which has gained much importance since the opening of the Callide coal-mine, is to have an all-weather airfield. It will be built on the site of an existing small airstrip three miles from the centre of the town, and will have a runway capable of handling four-engined aircraft.

For Philatelists—1

QANTAS are making special arrangements to fly Coronation-stamped letters, including special souvenir envelopes, to London from twelve points on their routes; details may be obtained from the company's London H.Q. at Airways Terminal, Buckingham Palace Road, S.W.1.

For Philatelists—2

AMONG rare stamps and covers to be auctioned at Bournemouth by Robson Lowe, Ltd., tomorrow (May 9th) is a *Daily Graphic* "balloon postcard" carried on a flight towards Russia in Tanner's "Mammoth" balloon in 1907. The balloon landed at Tossé, Sweden; the card, found in a mailbag jettisoned over the sea, was posted to London. It is valued at £11.



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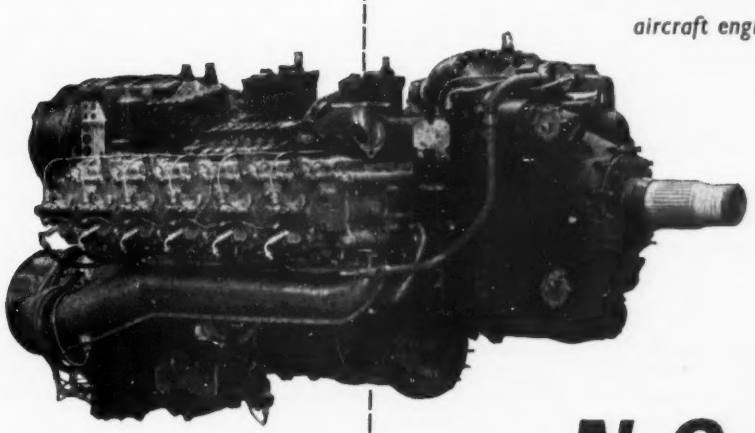

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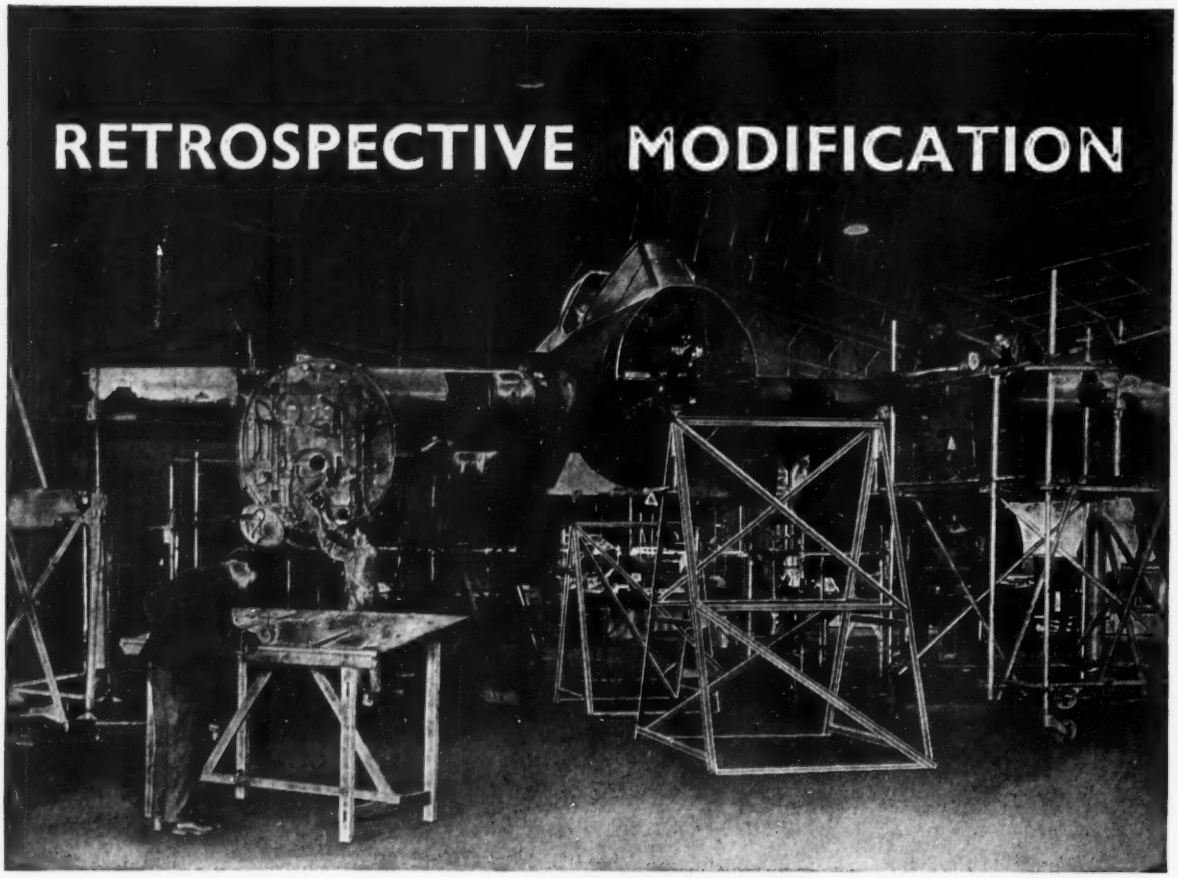

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THIRD-PRIZE TWO-SEATER

Third-prize Winner in the Royal Aero Club Competition

It is our intention to provide a description of the first three prize-winning designs in both two-seat and racing sections of the Royal Aero Club's recent Aeroplane Design Competition. The first and second two-seaters were dealt with in our issues of April 10th and 24th, respectively, and the top-ranking racer in our April 17th issue. This page concerns the two-seat design that won third prize.

THE entrants of the two-seat tourer/trainer design which gained third prize in the Royal Aero Club Design Competition were T. Boughton, J. E. Hart and G. S. Henson, all of Southampton. Their entry was referred to in our issue of April 3rd, when we published a perspective pencil-sketch of the design.

As the accompanying general-arrangement drawing shows, their entry embodies two unusual features: a "butterfly" tail and a tail-wheel-type undercarriage. Apart from this the design is straightforward enough, and it reflects the obvious practical experience of the three designers. Like many of the other contestants, the trio from Southampton have a definite idea of what form a two-seat club aircraft should take and are not the sort who specify a novel idea merely because it is novel, or looks good.

They say in their specification "As pilots we have felt the need for such a type among post-war British aircraft. In the period from 1925 to 1939 many good aircraft to a similar specification were built and flown, but since 1945 no replacement has appeared for the basically pre-war designs with which British flying clubs are equipped."

Familiar words appear in their general remarks: "robust, simple and suitable for quantity production" . . . "capable of development"—and less-familiar, but just as necessary: "good vision over the nose and a long-travel undercarriage." Around these parameters they have prepared a design which, in the opinion of the judges, showed detail design of a high order. From the specification, at least, it appears very attractive.

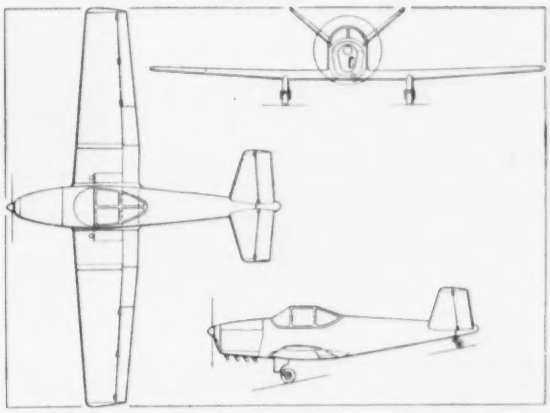
The Blackburn Cirrus Minor 505 is cowled conventionally in the nose, and drives a fixed-pitch, wooden airscrew. The wing has somewhat greater span than the average of the designs submitted; aspect ratio and thickness/chord ratio are also greater than usual. All-metal construction is specified on the grounds that such aircraft enjoy a world-wide market with a minimum of airframe servicing. The skinning is simple, wrap-around sheet except at fillets and above and below the nose, where some double-curvature has been found unavoidable.

The wing skin is stiffened by Reduxed spanwise stringers. The entrants give reasons for their choice of this well-known bonding method; the principal factor is the improved panel-stability thereby gained and another advantage is expected to be a smoother exterior. The skin is carried entirely by the stringers which, in turn, are laid over the ribs. Since the ribs do not touch the skin, the entrants hope that their use of Redux and careful maintenance of the wing during its working life will enable some degree of laminar flow to be achieved. In fact, they state that the maintenance of smooth flow back to 30 per cent chord would increase cruising speed by 4 m.p.h. The judges thought this rather doubtful, but it should be noted that such gains would be additional to the quoted performance, for the latter was based on the assumption that no extensive laminar flow was achieved.

The vee-tail was another point which the judges criticized, chiefly on account of the "complex control runs and gearbox" required. But the entrants have had first-hand experience of building and operating such a tail and clearly do not consider this criticism to be valid. In any case, the layout was adopted only after careful comparison with a conventional empennage.

Other controls are conventional and thin metal skinning is employed for all surfaces. A plain flap of 23 per cent chord is fitted over 50 per cent of the span, continuous under the fuselage. The gated settings are: up, 15 deg, 30 deg and 60 deg; operation is by manual linkage. Differential brakes are fitted and the tailwheel is steerable when the control column is pulled fully back.

A shortcoming of many contemporary aircraft is, in the designers' opinion, an unsatisfactory cockpit layout. Their own design bears witness to the trouble they took to perfect such items as seating, instruments and controls, even to the extent of building a mock-up. The seats are slightly staggered—as in de Havilland two-seat fighters—in order to reduce fuselage frontal area and provide greater comfort. A figure of 31 per cent of the total profile drag is quoted for the fuselage in the cruise condition—a surprisingly high figure—and this was considered sufficient to warrant particular care in reducing fuselage dimensions and excrescences.



BOUGHTON-HENSON-HART TWO-SEATER

Blackburn Cirrus Minor of 75 b.h.p.

Span, 33ft 4in; length, 22ft 4in; wing area, 148 sq ft; empty weight, 712 lb; all-up weight, 1,217 lb; maximum speed at sea level, 133 m.p.h.; cruising speed at sea level, 114 m.p.h.; stalling speed, 39.6 m.p.h.; initial climb, 672 ft/min at 75 m.p.h.; take-off distance over 50ft, 278 yd in still air; fuel consumption at maximum cruising power, 5 gal/hr; range with 20 m.p.h. headwind to 10 per cent reserve, with 17.6 gallons of fuel, 296 miles.

The result, with the fuselage chosen and with a smooth exterior finish throughout, is held responsible for much of the margin of performance enjoyed by the design over similar aircraft now flying.

Data are given in the entrants' specification for two types of aircraft, the Series 2 being a variant of the basic design. While the Series 1 is powered by the de-rated Cirrus Minor the Series 2 is to have an engine giving 90 h.p.—and even this keeps about 10 h.p. in hand. The Series 1 aircraft is classed as an ultra-light aircraft by its designers, but the second design is to carry full V.H.F., blind-flying instruments, navigation lights and increased tankage.

Another feature of the Series 2 is a nosewheel undercarriage, this being considered desirable at busy airfields. The Series 1, on the other hand, adheres to a tailwheel, chiefly on account of the excessive pitching of nosewheel-type aircraft on rough grass surfaces. The Series 1 is also foreseen in two versions, either with or without the cockpit canopy. Without the canopy the type is considered more suitable as a purely sporting aircraft; solo and without luggage the A.R.B.'s Fully Aerobatic requirements are met.

In the designers' words, the aircraft "is designed for production by an aircraft firm equipped for the manufacture of sheet-metal aircraft." The heaviest flanges are in 14 or 16 gauge, stringers are in 18 to 22 gauge while the skin gauge is generally 24. Except for the aforementioned limited use of Redux bonding all joints are riveted or bolted. The entrants' brochure gives very clear costing information, the calculations beginning with a man-hours per pound figure, and introducing a learning curve of the $Y = AX^{-n}$ nature. The final addition, based on a run of 50 aircraft, is (per aircraft): Labour, £249; jigs and tools, £180; raw material, £84; wheels, tyres and brakes, £58; fuel tanks, £21; engine, £285; airscrew, £25; instruments (Govt. surplus, A.R.B. approved), £27; overheads, £498; total, £1,427. On this basis the market price is placed at about £1,700.

SUPERMARINE'S NAVAL ORDER

OFFICIAL confirmation is now to hand of an order for "a substantial quantity of twin-jet fighters developed from the Supermarine 508." Though details of the new aircraft are not released, it is understood to have swept wings and presumably the power units will be late-mark Avons. It will, of course, be supersonic.

The Type 508, two prototypes of which exist, has satisfactorily completed deck-landing trials. Previous naval (or water-based) fighters from the Supermarine stable were the Baby, Sea Lion and Sea King flying-boats, the Spitfire floatplane and the long series of Seafires, culminating in the Mk 47.

STRATOJET AT WORK

By JACK WECKER

Sitting on dummy thousand-pounders are (left to right) Gerald Simons, Ed Bracher and Ed Hartz. They were the Boeing crew of B-47B No. 1-2137 seen in the background during the latter's intensive flying described below. The engines, it will be noted, are Studebaker-built J47-ST-25s in the new, flat-fronted pods.

AMERICA'S biggest single aircraft-procurement programme concerns the Boeing B-47B Stratojet, which is being built by the hundred at three plants—Boeing at Wichita, Douglas at Tulsa and Lockheed at Marietta (Georgia). Production Stratojets have been flying many months and no longer suffer from the numerous troubles which once were characteristic of the type. They are now gradually being placed on a fully operational basis, able to drop real bombs at representative heights and speeds. One aircraft, in particular, was subjected to an unusually intensive work-out; and this is described in the story that follows. The colloquial style is explained by the fact that the original narrative was written for the Boeing company's house magazine. We are indebted to that publication for permission to reproduce the account in slightly abridged form.

IN the category of targets for strategic bombing, Crescent City, California, is so far down the list that a bombardier with good sense of direction wouldn't touch it in a hundred years. Its only claims to fame lie in its fishing fleet, redwood forests and a prosperous dairy industry. Thus, it may come as a shock to Crescent City's 1,706 residents to learn that their town is among the most thoroughly bombed spots in the United States.

The citizens of nearby Ukiah, on the other hand, already have had their shock. They had it the day they saw a column of round white objects parading majestically across the sky

Fortunately, neither Russians nor spacemen are responsible for these happenings on the north coast of California. The blame, or more properly the credit, rests primarily with a handful of residents of Wichita, Kansas.

The complacent community of Crescent City was obliterated—theoretically, of course—by fourteen bombing attacks, all carried out by a single, civilian-manned Boeing B-47 Stratojet. The town was given such dubious distinction because, in an unstrategic sense, it is an ideal target. It is situated on a peninsula which stands out like Marilyn Monroe on a bomber's radar scope.

The bombings of Crescent City took place as part of one of the toughest shakedowns ever given a new airplane. A B-47B, tactically equipped, was taken off the Boeing production lines at Wichita and pushed through a rugged series of 121 flights, totalling 1,000 hours in the air. Technically, this sort of program is known as an "accelerated service test."

"The purpose," explains N. D. Showalter, chief engineer of Boeing's Wichita division, "was to put 1,000 hours' flying time on a single B-47 as rapidly as possible. We wanted to duplicate as far as possible certain types of combat conditions, on a day and night basis, and record fully all performance data on the airplane."

The test program was requested by Maj. Gen. Clarence S. "Bill" Irvine, deputy commander for production at Air Materiel Command headquarters. Elliott Merrill, chief of flight test at Wichita, selected both the airplane and the project pilot, Ed Bracher, 39-year-old veteran of 356 North Atlantic crossings and 92 Stratojet flights.

To some extent, crew members were alternated, but Bracher and Ed Hartz, supervisor of production flight test activities, did most of the piloting. In the course of it, they became the first flyers in the country to log 1,000 hours on the B-47s. Gerald Simons, serving as chief navigator-bombardier-radar operator for the program, ran his total to 550 hours.

Simons, as though his three-headed flight duties were not sufficient, had also to master the art of cuisine. His galley, located in the nose of the airplane, was somewhat less complex than the nearby "pickle-barrel" bombing system and the maze of not-to-be-talked-about equipment. It consisted of an electric oven and a hot cup for warming soup, coffee or chocolate.

At chow time, established less by the clock than by the appetites of those aboard, the navigator would warm the food and pass it to the pilot's and co-pilot's stations. The meals generally consisted of sandwiches, coffee, cup cakes, fruit juice and candy, but even this menu at times gave the chef trouble.

On one occasion when Rod Randall had been flying co-pilot, he complained after landing that the B-47's oven wasn't working properly. To make his point clear, he told the flight-line foreman, "We crossed three midwestern states and were well into the fourth before this thing turned out a toasted cheese sandwich." A new oven was supplied.

In all, the 121 missions took the Stratojet over 39 states. Flights averaged more than 3,000 miles apiece, but with aerial refueling, jaunts well in excess of this were not uncommon. Altogether, the B-47 was flown 432,066 statute miles, equal to nearly seventeen times around the globe. Half of the time was logged at night.

Closest thing to real combat—apart perhaps from frequent "attacks" by jet fighters protecting various sections of U.S. terrain—were 92 bombing runs. On an even dozen, real bombs were dropped; the rest were simulated bombings. On all of them, though, the bombardier took command of the plane, opened its bomb-bay doors, and whisked across the target.

It was on one of the fourteen Crescent City runs that the Ukiah switchboard was flooded with reports of the disk-shaped objects in the sky. The mystery was solved by an excited radio-tower operator, who learned from the B-47 crewmen that their airplane was, in effect, blowing smoke rings. The rings were contrails, puffed out by the bomber's six jet engines. Vapor trails of this doughnut variety, while not the standard thing, do occur sometimes at high altitudes when the air has low moisture content.

A number of things occurred at high altitude to enliven the monotony of 1,000 hours in the air. The shakedown plane—known formally and otherwise only as No. 2137—often thumbed rides on swift jet streams, with startling results in terms of speed.

On one occasion, streaking eastward over Chicago, the pilot told a woman control-tower operator below that he expected to arrive over New York City in an hour and five minutes. "You mean *two* hours, don't you?" asked the operator. The Stratojet pilot repeated his original ETA for New York, and heard the astonished woman whistle into her microphone. He wasn't kidding either, for his B-47 covered the 725 statute miles in only 65 minutes.

Even more remarkable was a stretch between Albuquerque and Wichita, during which the Boeing B-47 held a ground speed of 794 m.p.h. for thirty minutes. At 40,000 feet the plane had found a pip of a jet stream.

Ground radar screens picked up the high-flying bomber in a number of sections of the country. Fast-moving interceptors raced up to investigate.

Excitement of a different nature came last summer when No. 2137 ran into a thunderstorm 36,000 feet above Florida. The crewmen saw their plane strafed by lightning and felt it buffeted by violent gusts. Its flexible wings absorbed the shock, however, and made possible a ride so smooth that Co-Pilot Jim Goodell declared, "If I wasn't along, I wouldn't believe it."

The 121 missions took the Stratojet over the edge of two oceans and the Gulf of Mexico. It was over the Gulf that the twelve loads of actual bombs were dropped. Each load, comprising eight 1,000-pound bombs filled with sand, went whistling down onto

the blue-water bombing range of Eglin Air Force Base, a target area 50 miles off the Florida coast. The bombs were released from an altitude of eight miles.

Simulated bomb drops, on the other hand, were made over many of the country's principal cities, as well as some of its lesser ones. Toledo, Chicago, the Dade County courthouse in Miami and the power plant at Klamath Falls, Oregon, rated the cross-hair treatment. Klamath Falls ranked second to Crescent City in number of bombings. Toledo came in third in the final standings.

To provide realistic performance statistics on these make-believe bombing missions during the accelerated service test, the B-47 stayed in the air until it burned off fuel equal in weight to a bomb load.

Much of the fuel burned in the program was supplied in mid-air, by Boeing KC-97 tankers which served as "aerial filling stations." Using the Boeing-developed Flying Boom system, 69 fuel transfers were made—half of them at night and all of them without incident.

Missions averaged eight and a half hours each, some lasted twelve or thirteen hours, and one kept the bomber in the air fourteen hours and twenty-five minutes.

The 121st mission was all cake, a short shot to Denver's Lowry Air Force Base. Even this one was for business rather than for barnstorming; it involved measuring landing and takeoff distances required by the B-47 in the relatively high-altitude atmosphere of Lowry.

It was 6:21 p.m. on February 26 when Ed Bracher touched the wheels down on Wichita's 12,000-foot strip to complete the Denver mission. The 1000 hours were over—1000 hours and 24 minutes.

Just as they had after all previous flights, the ground crew took over. This time, however, the groundlings did not hustle to prepare the ship for another mission. This time they launched a detailed check of many items to see how they had taken the grind. No. 2137 sat there looking for all the world as trim and ready as her newly completed sisters parked alongside.

Ed Bracher stood and looked at her. He used the term "sensational" to describe her. "Between us and the Air Force," he said, "the B-47s have been subjected to a lot of flight hours before—but never on such a scale as this. We flew the daylights out of this airplane, and she stood up like a million pre-inflation dollars."

Later, speaking for the Air Force, General Irvine said it this way: "I feel certain that Boeing has gained invaluable knowledge from these tests, just as we of the Air Force have. It has been a rewarding and exceedingly worthwhile experience."

BOEING JET TECHNIQUE

A Simulated Commercial Flight with a Stratojet

ALTHOUGH a British turbojet airliner has been flying for nearly four years, many overseas manufacturers and operators continue to turn a blind eye to the successful results which have been achieved and to the countless techniques which have been evolved. To the best of our knowledge only the Boeing Airplane Company is actually building a foreign potential competitor to the Comet. Whereas the Comet I was built with no large multi-jet experience behind it, the Boeing Project "X" will benefit—by the time it flies—from some 100,000 hours of flight by the B-47 Stratojet. In view of this, the recent remarks of John B. Fornasero, chief of flight test at Boeing, are interesting.

In a lecture to the Air Safety Forum of the Air Line Pilots' Association in Chicago recently, Fornasero first smacked back the subtle propaganda of the Aircraft Industries' Association and the C.A.B. by declaring that a big jet was a good deal easier to fly than a piston-engined aircraft and presented no unusual problems of operation. To illustrate his points, Fornasero said that the generalities could be more clearly presented by taking an actual turbojet aircraft and following it through a hypothetical airline transport flight. He selected the B-47 for this because it was well evaluated and had over 45,000 hours of flight experience already behind it. Fornasero's comments on this commercial B-47 flight are particularly interesting because Project "X" has been officially stated as being based on B-47 experience, even though it may have a different configuration. Doubtless, too, Fornasero has built up the following information from practical tests which he and his colleagues have been making with the B-47 and B-52 for Project "X."

Fornasero began by observing that some characteristics of this specialized military aircraft were not compatible with airline operation. Economic aspects would not be considered, and the B-47 for this flight would be equipped as follows: six J47-25 engines (two in pods near and under each wing-tip and four in double pods under and about one-third out on the wing from the body); standard-type radio and navigational airline equipment. Partial engine-inlet anti-icing at all times with complete engine, wing, and tail thermal de-icing available. Fuel and oil for the range expected, plus reserves and payload.

Preparation for the "flight" included the familiar weather analysis, decisions on routes and alternates, planned loading including reserves, subsequent check of balance, and lodging of flight plans. Weather and icing considerations might be involved during the 20-minute climb to 40,000ft. Fuel allowances for start, taxi, take-off, and climb would be well established, although any prolonged holding for take-off could affect reserves. The aircraft would be equipped for all-weather climbs and except for very unusual weather conditions should be climbed directly to cruising altitude.

Climb could be conducted either by maintaining full power to altitude or by using a throttle setting giving approximately 96 per cent of full power. The fuel consumption and total engine revolutions during climb to cruising altitude would be nearly the same in either case. Temperatures would be slightly higher when full power was used, but resulting increased engine deterioration was a fraction of that due to comparable use of a reciprocating engine. Rate of climb would be high and layers of clouds and/or icing could be passed through rapidly, although de-icing would be available at any time. Engine cooling would present no problem and climbs could be made at the best angle-of-climb-speeds for ground clearance with only a moderate reduction in rate of ascent.

Five factors, excluding wind, affected cruise in a turbojet aircraft. They were altitude, Mach number, weight, outside air temperature and throttle position. Maximum obtainable range was obtained by selection of a proper altitude depending on ambient temperature, co-ordinating Mach number with power, and then allowing consequent gradual climb of about 1,500ft per *hour* as the weight decreased. This type of operation might not always be feasible with commercial operations because of traffic considerations. In a B-47, one altitude-range operation for a flight at maximum weight [185,000 lb—Ed.] amounted to a 5 per cent loss in range. For an airliner of equal weight this loss could be reduced. In any event, altitude was the first parameter to be determined for a given flight. With a constant-altitude flight, power had to be gradually reduced as weight decreased, in order to maintain a pre-selected Mach number. A good rule-of-thumb for turbojet cruise operation was to remember the cruise Mach number and always adjust power to maintain this Mach number. Selection of best altitude then depended on variations of temperature and weight.

Assuming a condition of a 120,000-lb aircraft at the start of cruise, performance data would show that a cruise profile at 40,000ft gave a maximum single-altitude range. If the initial cruising weight was 130,000 lb, the maximum range would be obtained by flying at 38,000ft. Variations in air temperature from a standard day affected altitude only. In actual practice, the selecting and holding of cruise-conditions was very simple, and cruise parameters could be varied to give good operational flexibility without unreasonable range losses. Engine-inoperative cruising was normally handled by reducing altitude and setting a new Mach number with the remaining engines. Proper cruising in a turbojet aircraft was easier to achieve than it was to describe, and very little training or practice was necessary to understand and operate a turbojet for cruise.

To cruise efficiently, turbojet aircraft had to fly at high altitudes—generally over 35,000ft. Operating at altitudes over 25,000ft aggravated many problems of present-day transport flying, but these problems were not insurmountable. Aircraft designers, said Mr. Fornasero, must design foolproof doors, hatches and windows, which were also safe if they failed [*sic*]. Emergency equipment and procedures had to be well established; the aircraft must be aerodynamically capable of high, safe rates of descent; and the operators must learn and use properly all things associated with operation at high altitude. Altitude operation above 25,000ft was not a "boogie"" and it should and would not hold any greater effort to supply altitude service than it was to learn to operate from 10,000ft to 25,000ft. We could not advance the art without going up.

Turbojet aircraft had also to operate at a high relative percentage of limiting speed to obtain efficient cruise. In other

(*Continued on page 576*)

CIVIL AVIATION ADMINISTRATION

Problems in New States: The Need for Exchange of Experience

By VICTOR L. G. GORE

LAST year 45 million people flew on the world's airlines. Comparing this figure with the 2½ million the world over who used airlines in 1937, the development of air transport in the post-war years becomes most strikingly apparent.

This tremendous increase in the volume of transportation resulting from rapid technological progress has been accompanied by revolutionary changes in equipment and technique. New problems of airport design, runway construction and ground facilities followed in the wake of this development and improvements in navigational and landing aids and communications presented new tasks to be solved by civil aviation administrations.

Air transport operations have spread across the globe and practically all States—large and small—now have, or desire to have, a stake in them, or at least to provide the necessary ground facilities. Of the 57 contracting States of I.C.A.O., 45 operate internal services, while as many as 24 have long-range or transoceanic operations. As about one-fifth of I.C.A.O.'s membership consists of recently established States, it is evident that the necessity for civil-aviation administration is no longer confined to those nations with a long-established aviation tradition, where the necessary specialized skill has developed together with the growth of technological know-how and resources. Countries which only recently joined the flying fraternity of nations, newly established States which have to build up their administrative machineries from scratch, or those which, after the desolation of war, re-entered aviation—to all these the setting-up of civil aviation authorities has been beset with serious difficulties.

The function of any enlightened government in relation to civil aviation can be best summed up in the clipped language of the 1945 Civil Aviation Act: "Organizing, carrying out and encouraging measures for the development of civil aviation, for the designing and production of civil aircraft, for the promotion of safety and efficiency in the use thereof, and for research into questions relating to civil air navigation."

To handle effectively such a diverse field of responsibilities, an administration requires an adequate staff well versed in the different branches of aeronautical activity.

For the small State, the problem of setting up an adequate and efficient aviation administration is therefore much more difficult than for a dependent territory or for the larger or richer country. For while the former, dependent upon the mother country, is absolved from direct responsibility for a whole group of problems, the financial skill and material resources of the latter make the problem much easier. Leaving aside specific duties and authority arising from particular constitutional positions of civil-aviation administrations in different governments, the main problem facing such administration in a small state is how to cover the wide field of responsibilities with the usually limited material, technological and manpower resources at its disposal.

A fundamental principle in public administration is a clear definition of administrative responsibility and authority. In aeronautical administration, concerned as it is with human activity in a strange and new element, this principle in particular should be carefully observed. It will become especially important in mishaps and accidents where a human weakness for "passing the buck" of responsibility might distort truth and facts and make future remedies impossible.

The second principle is to ensure an absolute independence of judgement of the aeronautical authority by separating it entirely from direct operational and commercial responsibility. In other words, while the aeronautical authority inspires, plans and controls air commerce, it is not charged with the direct operation; conversely, those responsible for air-commerce operations are entirely divorced from the overall responsibility and authority of a country's civil aviation.

The third fundamental principle of efficient aeronautical administration is to ensure that technical matters are dealt with by qualified personnel and that lines of authority and responsibility are as short and direct as possible. Supervision, control and policy in technical fields, and the work of technical-field officers, should be supervised by technically trained men. For each major function or group of functions, there should be someone on a senior executive level who can talk the same language as the field man on the operational job.

MANY newly-established States and under-developed countries find themselves faced with the problem of setting up civil-aviation administrations within the framework of their governmental machinery. In many cases, lack of experience and shortage of trained personnel and material resources cause major difficulties. The author of this article touches briefly on some of the problems encountered during several years spent in assisting a newly-established State to set up its civil aviation administration. He also summarizes the contrasting types of organization in several countries, and makes a plea for international exchange of information on such matters.

In practically all countries, the framework of the civil aviation authority has been in a state of constant evolution. Parliamentary committees, civil service commissions, boards of advisers, experts, planners and reformers have all grappled with the problem, adjusting, modifying, reconstructing and reshuffling the structures. In the face of the dynamic expansion of civil aviation, it is indeed a good thing that government authority has not remained static and followed—if not aways precipitated—the dynamics of air commerce.

The nature of these recommendations and structures varied, and varies, with the constitutional position of civil aviation in each country. But whether the civil aviation authority is involved in the financial control of the carriers, or whether it exercises a more superficial control, one common element emerges from all systems of civil aviation administrations: civil air commerce is subjected to more penetrating control, supervision and intervention by the State than most other means of transportation.

It is sometimes suggested that this is due to civil aviation having developed mainly in a period generally marked by a wider interference of the State in the economic process. However, the fact that civil aviation evolves in a new element, that at this stage of its development it needs financial support from the State and that its progress is closely linked up with military development would appear to be a more correct explanation.

Preparing a Plan.—The first step in the preparation of a blueprint for such a structure is to survey the existing situation—to take stock of what there is, to analyse the needs of the country and its potentialities in aviation development from the geographical, economic, technical, demographical, political and financial angles. Such an analysis will serve as a starting-point for all studies and deliberations aimed at setting up or improving a civil aviation administration.

In preparing the blueprint, the planner has to consider a country's current and future needs in civil aviation, and the available and potential manpower resources and to relate them all to the country's material capabilities. Academically perfect plans which do not reflect these elements are bound to relapse into the domain of frustrated planning. Finally, social and material conditions will have a major bearing upon the success or failure of any such blueprint, and any pattern of an administrative system which ignores the psychological climate is conceived in a barren vacuum.

It goes without saying that the actual organizational framework of civil-aviation administration in a smaller State must couple efficiency with economy in establishment. For reasons of economy and (even more frequently) because of lack of adequate skilled manpower resources, it will be impossible for a small administration to indulge in a high degree of specialization as is practised in some major countries.

Nor will it be prudent to create high-level posts which would be occupied by medium-level experts. In such circumstances, an efficient organization would endeavour to ensure the correct channeling of problems by grouping a number of technical services under one experienced head. In this manner, there is at least a common language assured between the operational technician and his high-level superiors. At the same time, younger men selected for ability and of adequate educational background should be placed as cadet-officers and in such positions in the administrative set-up as to enable them to acquire gradually the necessary experience. Here fellowships granted by I.C.A.O. under the Technical Assistance Programme can (and indeed do) fulfil an important training function. But both for short-term as well as for long-term planning, these fellowships are best utilized if granted to younger men with higher education and an adequate

ground in their future specializations to enable them to absorb the wider issues of aviation problems.

Typical Approaches.—The pattern of organization developed in Denmark, Netherlands, Norway and Sweden shows a similar grouping of responsibilities and channelling to that discussed here. Extensive studies of the problem, backed by some experience, already shows that in under-developed countries (and in the absence of adequately trained and experienced men capable of controlling highly specialized air policy) a concentration of tasks in sections, or the grouping together of related functions under one technically trained man, ensures greater efficiency and economy. Such administration will produce better results in shorter time than that built on a larger number of high-level posts held by laymen.

The accompanying diagrams show the administrative structures of civil aviation authorities of the four countries mentioned above, as well as a blueprint for such an authority prepared for Israel; the latter resembles closely the pattern of Denmark and Norway, and shows the principle of separating non-technical functions (which can be safely entrusted to "pure" administrators) from the supervision of technical operations which are grouped together and placed under technically trained officers.

Which Ministry ?—The lines upon which a civil aviation authority is organized are perhaps more important than the question of the type of its paternal organization. As long as its scope is adequate to discharge efficiently its responsibilities, as long as the authority and responsibilities of the chief and his subordinates are clearly defined, and as long as the status of the chief is adequate to ensure quick high-level decisions and contact with the appropriate cabinet member, then it is really immaterial which ministry has the department under its wing. In 21 States the civil aviation authority is in Ministries of Transport and/or Communications; in six it is a separate independent body of ministerial status; in four it is administered by special boards. In 11 Latin-American countries civil-aviation authorities form a part of Defence or War Ministries, as they do in Yugoslavia,

In the "family trees" below are summarized the administrative structures of three Scandinavian countries and Holland, together with a plan prepared for Israel; it will be seen that this is based on the pattern of the Norwegian and Danish organizations.

ISRAEL

MINISTRY OF TRANSPORT AND COMMUNICATIONS

SEAPORTS AND AIR SERVICES

Advisory Committee on Technical matters — DEPARTMENT OF CIVIL AVIATION

Air-traffic and Licensing Division
- Airworthiness certificates
- Aircraft registration
- Personnel licences
- Legislative studies
- Rules and regulations
- Operational permits for domestic, foreign scheduled and non-scheduled flying
- Statistics
- Employment conditions of aviation personnel

Technical Services Division
- Air-traffic control and services
- Telecommunications
- Information services
- Accident prevention
- Operational inspection
- Airworthiness and maintenance supervision
- Planning and supervision of installations and services at airports
- Aeronautical training of aviation personnel

Auxiliary Services Division
- Auxiliary ground services
- Airport economics
- Airport fees and charges
- Facilitation
- Concessions
- Liaison with other Government depts.
- Supervision of real estate and property
- Planning and supervision of non-aeronautical installations
- Budgetary matters
- Air propaganda

DENMARK

MINISTRY OF PUBLIC WORKS

DIRECTORATE OF CIVIL AVIATION

1. Legal Administrative Division
- 1a. Legislative matters, appropriations, air agreements, permits, schedules, personnel
- 1b. Airports and airfields, airport fees and charges
- 1c. I.C.A.O. matters
- 1d. Building and construction
- 1e. Bookkeeping and accounts

2. Technical Div.
- 2a. Airworthiness, maintenance, tech. licences, accident investigation (material), line inspection
- 2b. Flight inspection, personnel licensing, flight training, inspection of flying schools, maps and charts, line inspection, supervision of airfields, aircraft accidents investigation, technical treatment of matters classified under 1a-1c.

Air Navigation Services
- Air-traffic control division (A.T.C., A.S.R., Notams)
- Communications division
- Meteorological division

Local Administration (airports)
- Copenhagen, Aalborg, Esbjerg, Renne

SWEDEN

ROYAL SWEDISH GOVERNMENT

I.C.A.O. Scandinavian Secretariat | Military Assistant

ROYAL BOARD OF CIVIL AVIATION

Civil Aviation Inspection
- Operations and accident investigation
- Airworthiness
- Personnel licensing
- Aviation medicine

Airport Division
- Administration
- Electro-technical matters
- Planning

Air-traffic Division
- Rules of the air
- Air-traffic services
- Search and rescue
- Communications, information; met. service (in co-operation with the Met. and Hydrological Institute
- Radio equipment for navigation and communication (in co-operation with Board of Telegraphs)

General Admin. and Legal Div.
- Organization and budget
- Legal
- Foreign relations
- Accountancy
- Statistics
- Registry and archives
- Library

NETHERLANDS

MINISTRY OF TRANSPORT AND WATERSTAAT

DEPARTMENT OF CIVIL AVIATION — Secretary

- Central department
  - Planning bureau
  - Personnel bureau
  - Budgetary control
  - Construction control
  - I.C.A.O. affairs bureau
- Political and legal
- Airworthiness and operational inspection
- Telecommunications and air-traffic control
- Civil flying school (board)

NORWAY

MINISTRY OF TRANSPORT AND COMMUNICATIONS

DIRECTORATE OF CIVIL AVIATION

Legal and Political
- Legal matters, inc. civil aviation law policy
- Operating permits, domestic and foreign
- International traffic agreements
- Acquisition of land for civil aviation purposes
- Insurance problems
- National aircraft registry
- I.C.A.O. co-ordination

Finance and Personnel
- Budget
- Accounts
- Salaries
- Leases
- Fees, charges and taxes for use of air navigation services
- Customs and foreign currency problems
- Personnel

Airport Construction
- Airports, marine bases, including permanent facilities, except radio installations
- Buildings
- Airport lighting

Airworthiness
- Control and inspection of airworthiness
- Airworthiness certificates
- Maintenance
- Authorization of maintenance workshops and personnel

Inspection
- Operational supervision of scheduled, non-scheduled and private flying
- Supervision of training and competency of civil aviation personnel
- Testing, medical examinations, licensing of personnel
- Accident investigation

Air Traffic
- Co-ordination, supervision and planning of air-traffic safety, including air-traffic services
- Telecommunications, navigational aids, met. and information services
- Combined air-traffic service units and rescue co-ordination centres
- Administrative matters relating to maps and charts and hazards to air navigation

CIVIL AVIATION ADMINISTRATION . . .

Egypt and Saudi-Arabia. In four countries civil aviation is a branch of a primarily military Air Ministry, in three it is looked after by the Ministries of Commerce, and in two by Postal Authorities, and in two others (Denmark and Syria) by Public Works Departments.

It is in the nature of the problem that its solution varies in accordance with the individual circumstances of a country, its needs and possibilities. But there appears also to be a need for more documentation and opportunity to learn from other people's experiences, and to study objectively the best ways for administering civil aviation without setting up cumbersome "blue-tape" machinery.

For the dangers of emulation are many. There are, in many States, sprawling aeronautical administrations with little heed for economy in manpower and material resources; and as experts and advisers are but human beings rooted in their backgrounds, they often carry with them the germ of such cumbersome administrations and methods and introduce them to countries where a new start could have been made. The first things that a new administration is apt to learn from its senior brothers are, of course, the easiest ones: the trappings of authority and bureaucracy.

Need for Information.—Here a gap especially evident to administrators and planners in new States or under-developed countries could be well filled by I.C.A.O.—if that organization were to undertake a study and prepare a report on civil aviation administrations in the world. The U.N. Special Committee on Public Administration Problems state in their 1951 report that, "one of the main obstacles to useful international assistance in the solution of administrative problems is the scarcity of factual information describing current administrative processes and problems in various nations." Civil aviation administration is not an exception and hardly any correlated information material is available on its administrative, operational and management problems. Thus the suggested report would not have the character of recommendations but would limit itself to a careful compilation of factual data on administrative methods used in civil aviation in different countries and to an analysis of their problems. Such comprehensive documentation would provide administrators and planners with an important source of information—and perhaps of inspiration.

A direct interchange of views and experiences between those concerned with these matters could contribute materially towards a general improvement in civil-aviation administrations. Something on the lines of a special seminar for experts as suggested by the previously mentioned U.N. Committee for public administrators, might—to use the language of the report—"add valuable material to the body of knowledge and understanding in those fields and to the possibility of comparative studies which offer still wider prospects of mutual assistance and improvement."

Such an informal gathering (let us avoid the term "conference") and a free discussion between those handling the complex problems of civil-aviation administrations in more developed and under-developed countries would, one feels sure, be most welcome, irrespective of whether it would be sponsored by an individual country or by an international agency such as I.C.A.O.

BOEING JET TECHNIQUE (Continued from page 573)

words, if an aircraft were designed to a limiting Mach number at high altitude of 0.80, then it would probably need to cruise at about Mach 0.72. This percentage was higher than comparable percentages for reciprocating-engined transports and constituted one of the few factors demanding some changes in licensing regulations.

Endurance was of great importance, especially in the case of a commercial transport where holding time was not accurately predictable. Holding or endurance procedure for turbojets was very simple. Optimum endurance could be realized by cutting engines according to weight and altitude and maintaining level flight with the remaining engines. For instance, a B-47 which was holding with normal reserve fuel would have the following endurance :

Altitude	*Number of Engines Operating*	*Endurance*
15,000-25,000ft	2	113 minutes
30,000-35,000ft	4	126 minutes
35,000-40,000ft	6	120 minutes

At an altitude of 15,000ft to 25,000ft, operating six engines instead of two would decrease endurance from 113 minutes to about 95 minutes. Since engine shutdown was probably not desirable in normal commercial operation (although engine air starts were reliable, fast and easy), operations at less than optimum endurance would require additional fuel reserve allowance. However, the loss was not large and could be further reduced by proper design. Engines of recent design had better efficiency in holding conditions.

Descent was rapid and easily executed from any altitude. From 40,000ft, descent to sea level required about six minutes. Commercial transports would have even higher descent rates available for emergencies. With an aircraft at 40,000ft and a cabin altitude at 5,000ft, normal operations would probably be dictated by passenger comfort, so that descent lasted at least ten minutes. Here again a small fuel allowance, over and above a B-47 optimum operation, would be required. But fuel allowances for clearance on take-off, less than optimum cruise, and extended holding and descent conditions would always be apparent to some degree in any comparison of bombers and transports.

Approach for landing would be made in a pattern very similar to those for present commercial aircraft. Final approach in a B-47 would normally be somewhat flat, although it was easy to make approaches using the normal I.L.S. glide-slope. The B-47 was very clean and was designed with a bicycle-type landing gear, which inherently limited the attitude of touchdown and the ability to unload the wings for early braking. A drag chute and anti-skid device had been installed to reduce landing runs. Future turbojet transport designs would attempt to avoid the necessity for these devices by building-in greater aerodynamic drag and by using a tricycle gear for unloading the wings at touchdown.

Engine noise and airflow while starting and taxying had always been a problem and were undoubtedly aggravated with turbojet engines. In military aviation these effects were not of great concern, but in air transport they could be. Both noise and airflow could be minimized by careful attention to procedure. For instance, a turbojet lent itself very well toward attaining complete readiness for taxying with engine starting as the last procedure. With a little practice, ground-time with engines running could be cut to a very few minutes. Mr. Fornasero concluded his observations by expressing the opinion that subsonic performance would be our transport operating speeds for many years, since tremendous power with very poor efficiency was necessary to push beyond the point of abrupt drag rise; the latter was usually accompanied by buffeting and sometimes by trim changes. If an aircraft was properly designed, any change in trim or stability would be small or non-existent. To attain speeds greater than the point of abrupt drag rise required great increase in power or steep dive angles. Buffeting increased, but not to a disturbing level. Since there were virtually no structural considerations while operating at high altitudes, Mach number effects fell more in the nuisance category, and any "red line" limitations had very little importance or meaning. Of course, "red line" *indicated* airspeed limitations were still very necessary.

Stalling characteristics of turbojet aircraft should be little different from the characteristics of present-day transports whether a straight or swept wing was used. Power on stalling speeds would, relatively, not be as low as on airscrew-driven aircraft. This might be about the only real stalling difference between the two families of aircraft.

ON STEPPING OUT

Air Guide to Europe. Edited by Lionel Birch. Published by Newman Neame, Ltd., 50 Fitzroy Street, London, W.1. Price 5s.

THIS slim volume (about the size of a Penguin book) is filled with a wealth of general and esoteric information for the traveller to Europe. It is the first air guide to be written for nearly 25 years, and although primarily designed for the large numbers of people who will be taking advantage, for the first time, of the new cheap tourist-class fares on European routes, will also be of considerable value to the more experienced traveller. The facts contained in the *Air Guide* are clearly set out and easy to find : information is provided on such matters as fares, Customs, passports, currency, where to eat and drink (for various budgets), tipping and surface transport, and ranges from how to say "go away" in the Arabic tongue to the price of a Turkish bath in Istanbul.

The book is illustrated with some pleasing photographs and contains, as well as a sensible introduction to air travel, diagrammatic maps of many European capitals. On the back cover is some salutary advice on "How Not to be British Abroad"; this includes simple weights and measures conversion, and a reminder that in nineteen out of twenty countries traffic keeps to the right, which it is homicidally easy for the Briton abroad to forget

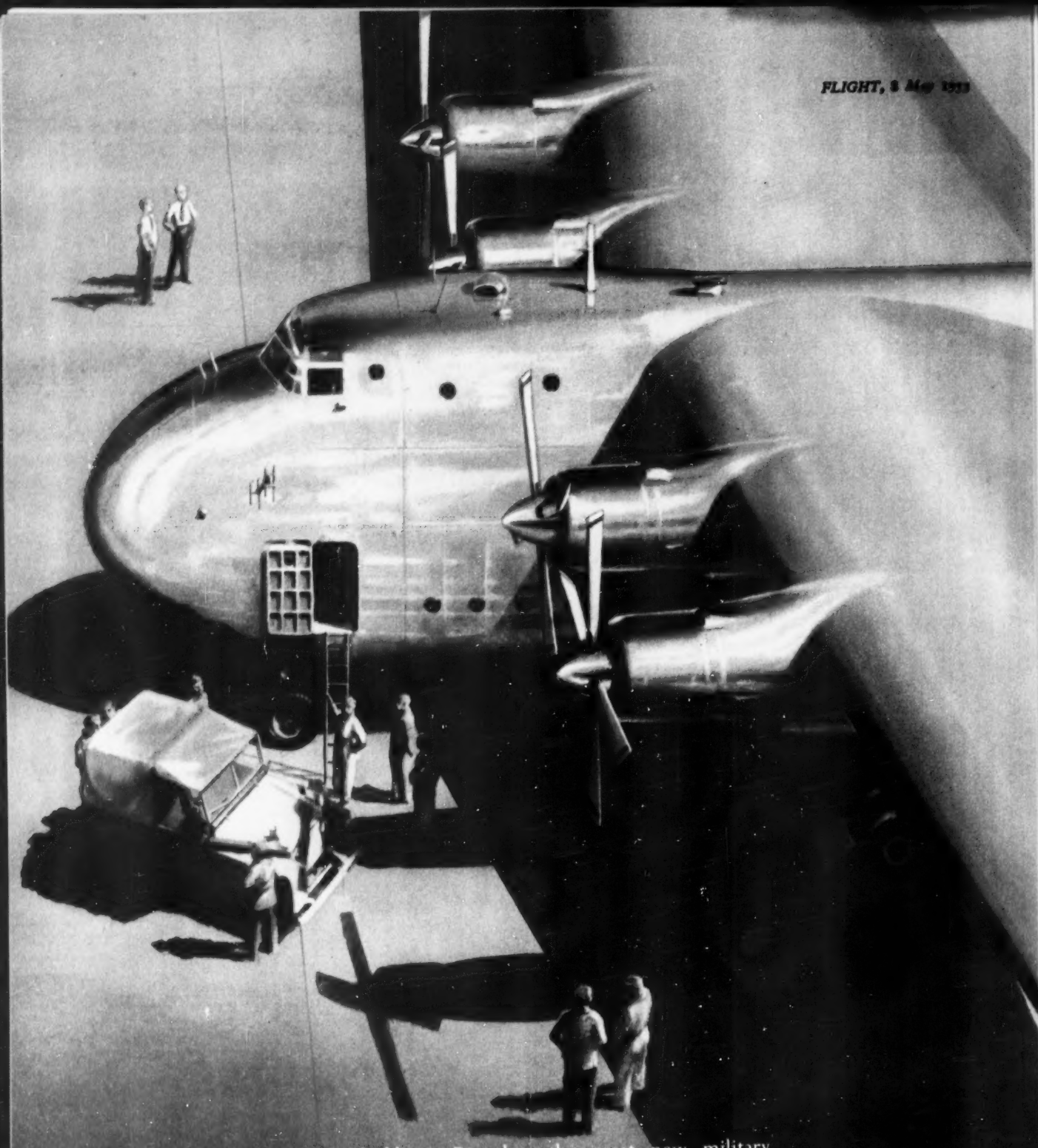
ANTI-SUBMARINE

For service in the Royal Navy—Fairey Gannets will operate from Fleet and Light Fleet Carriers. The Gannet is the latest specialised anti-submarine aircraft produced in Britain.

FAIREY GANNET

FAIREY AVIATION

THE FAIREY AVIATION COMPANY LIMITED · HAYES · MIDDLESEX



The Blackburn Beverley, the great new military freighter, is powered by four "Bristol" Centaurus 661 engines driving de Havilland hollow-steel-blade, constant-speed, feathering and reversing propellers.

DE HAVILLAND PROPELLERS

DH PROPELLERS

YOUNG

AIRCRAFT INTELLIGENCE

PISTON TRAINER: Now coming into large-scale production at Los Angeles is the North American T-28B, referred to on this page. Test pilot Bob Hoover is shown above with the prototype.

Great Britain

Auster Ambulance/freighter. Further improvements to this useful aircraft are the incorporation of a Mk 9 wing (greater area and less weight), larger flaps and a new airscrew. The Cirrus Bombardier is expected to give 10 extra horse-power, with a total of 190. What this means is strikingly evident from the following figures, the revised data being followed by the corresponding result for the original design, in brackets: full-load take-off in still air, 180 yd (270); distance to 50ft, full load in still air, 320 yd (465); initial climb, same conditions, 860 ft/min (670).

Napier-Engined Aircraft. With two important new engines under development, it is to be expected that the Napier company should be linked with a number of aircraft in innumerable unconfirmed reports. Overseas journals have printed the following statements: B.E.A. *Elizabethan*-class airliners will have Nomads; Blackburn Beverley C.1s will have Nomads; Canadair Britannia sub-hunters will have Nomads; a Shackleton will be used as a Nomad test-bed this year; and a Varsity will be used as a test-bed for the Eland turboprop. None of these statements can be commented upon by any of the companies concerned—least of all by Napiers. But it has been officially announced that, whatever engines are fitted to Beverleys, their airscrews will be D.H. hollow-steel (Britannia-class) units.

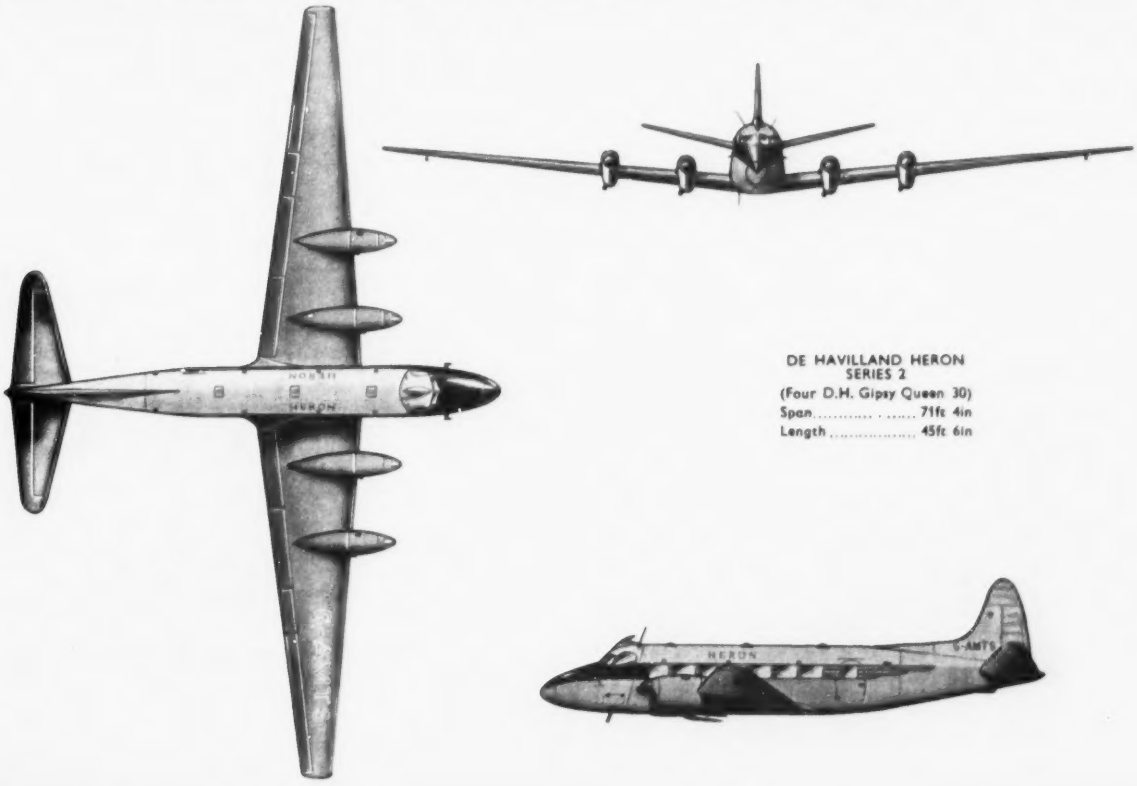
Canada

D.H.C.2 Beaver. Experimentally flying at Toronto is a Beaver powered by an Alvis Leonides. Longer, and of smaller diameter than the original Wasp Junior, the new engine is some 100 h.p. more powerful. As might be expected, an increase in fin area has been necessary. This type of Beaver is considered particularly appealing to British users, and there is talk of production in this country. Beaver production is now well past 500 and shows no signs of tapering off.

United States

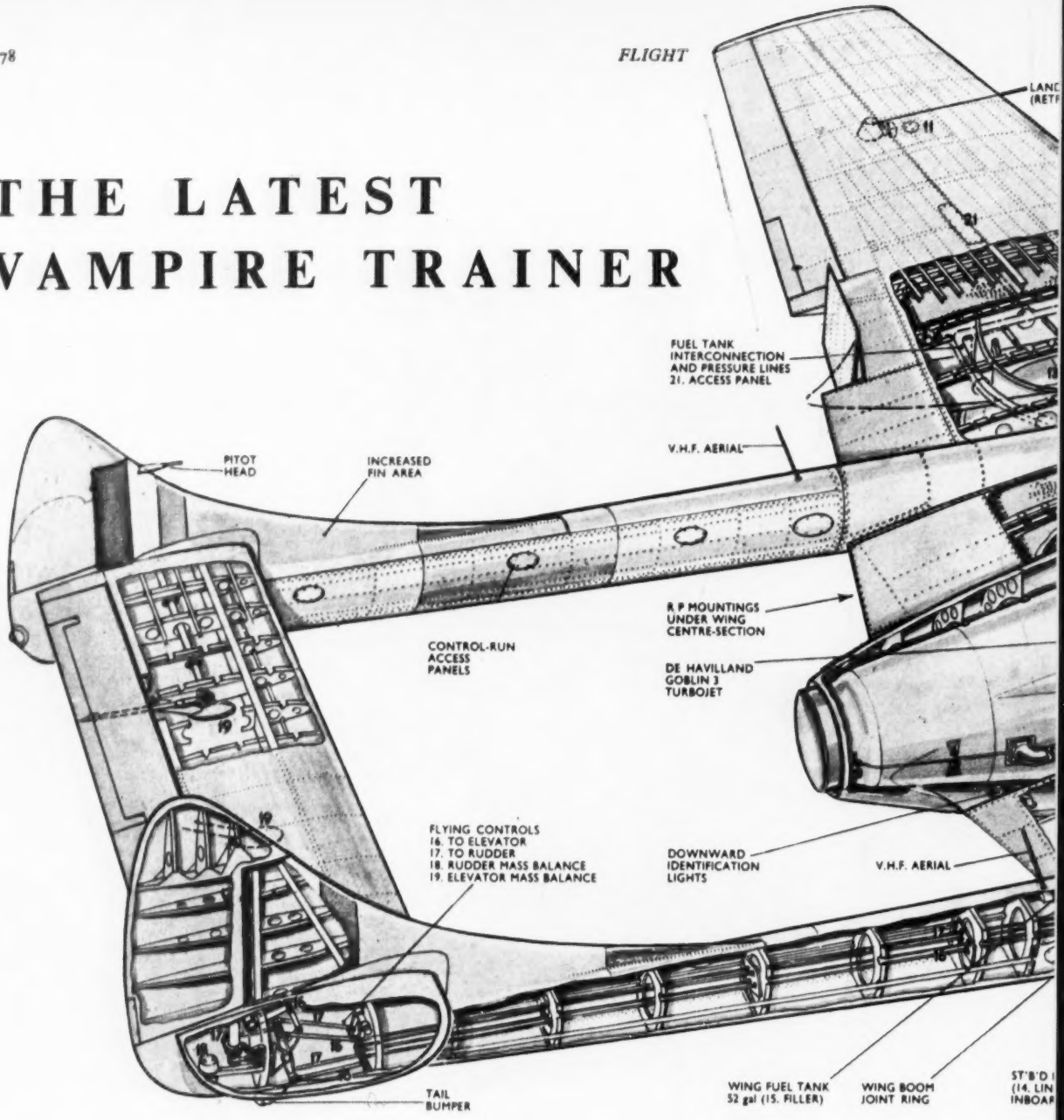
Douglas XC-132. Aviation Week has it that the forthcoming Douglas transport with 100,000 lb payload (this page, March 20th) will be known as the C-132 in service. Power will come from four Pratt and Whitney split-compressor turboprops of about 15,000 e.s.h.p. each. These engines will be developed from the J57 turbojet and appear to have great potential for the future.

North American T-28B. Shown on this page is the first of many T-28B trainers which are in production for the U.S. Navy at North American's Downey, California, plant. Easily the most powerful of the "Harvard family," the new aircraft has a full-size Wright R1820 Cyclone of 1,425 h.p. driving a Hamilton three-blade airscrew. Top speed is 345 m.p.h. and initial climb is 3,050 ft/min. Various combinations of ordnance, including fixed guns, rockets and bombs, can be carried. This prototype, at least, does not have folding wings or an arrester hook. There is some confusion over U.S. Navy aircraft by North American aviation; the T-28B should be T2J if Naval designation is applied. Similarly the new J-47 and Sapphire-powered Navy fighters should be F2J and F3J, and not FJ-2 and FJ-3.



DE HAVILLAND HERON
SERIES 2
(Four D.H. Gipsy Queen 30)
Span 71ft 4in
Length 45ft 6in

THE LATEST VAMPIRE TRAINER



SINCE the Vampire T.11 went into production, a number of modifications have been incorporated which, taken together, should materially enhance the efficiency of this already first-rate aircraft. Before these modifications are described, however, a brief historical note will be of value.

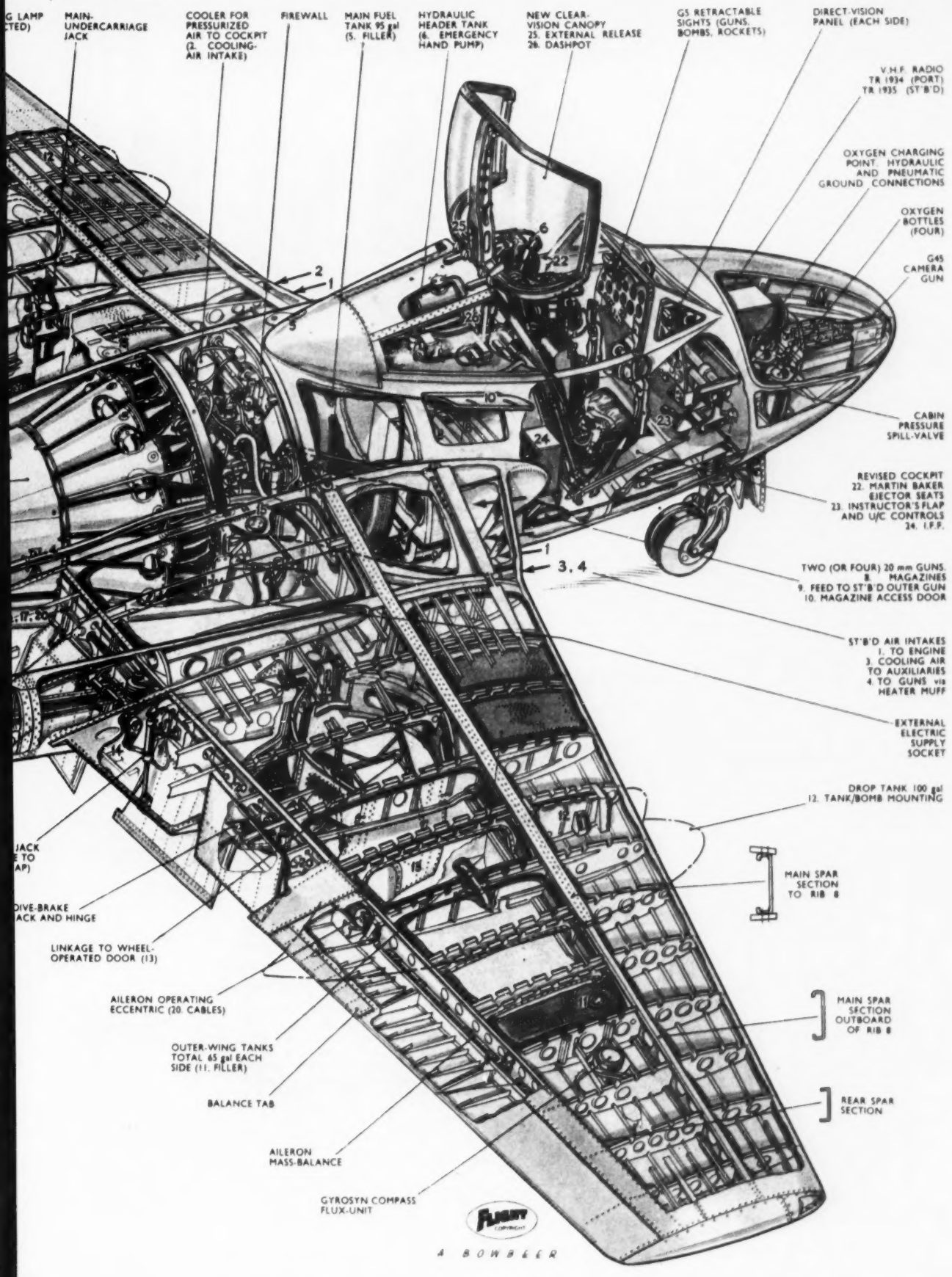
The first two-seat Vampire was the D.H.113 night-fighter, the prototype of which flew in 1949. A limited number of production aircraft were built and delivered to the R.A.F. and the Italian Air Force. The second two-seater was the Venom night-fighter (D.H.112) which, broadly speaking, comprised a 113 fuselage with Ghost engine and Venom wings and tail. Various marks of this machine are now in production for the R.A.F., and for a number of foreign Air Forces. Another two-seater is the Sea Venom, in large-scale production in Great Britain and France.

With such experience of the basic two-seat Vampire conception actually in hand, therefore, it was not surprising that de Havilland thoughts should turn to a trainer version: no firm M.o.S. order was received, but the company went ahead with the project as

D.H.115 VAMPIRE TRAINER

D.H. Goblin 3 turbojet of 3,350 lb thrust

Span	38ft
Length	34ft 5in
Height	6ft 2in
Wing area	262 sq ft
All-up weight	11,150 lb
All-up weight with two 100-gal external tanks	12,920 lb
Normal wing loading	42.6 lb/sq ft
Maximum speed	467 kt (538 m.p.h.) at sea level; 476 kt (548 m.p.h.) at 20,000ft and 452 kt (520 m.p.h.) at 40,000ft
Limiting Mach number very nearly 0.8 without external tanks	
Range without external tanks, 685 n.m. at 30,000ft, or 325 n.m. at sea level	
Range with underwing tanks, 1,015 n.m. at 30,000ft, or 515 n.m. at sea level	


G LAMP CTED)
MAIN-UNDERCARRIAGE JACK
COOLER FOR PRESSURIZED AIR TO COCKPIT (2. COOLING-AIR INTAKE)
FIREWALL
MAIN FUEL TANK 95 gal (5. FILLER)
HYDRAULIC HEADER TANK (6. EMERGENCY HAND PUMP)
NEW CLEAR-VISION CANOPY
25. EXTERNAL RELEASE
26. DASHPOT
G5 RETRACTABLE SIGHTS (GUNS, BOMBS, ROCKETS)
DIRECT-VISION PANEL (EACH SIDE)
V.H.F. RADIO TR 1934 (PORT) TR 1935 (ST'B'D)
OXYGEN CHARGING POINT, HYDRAULIC AND PNEUMATIC GROUND CONNECTIONS
OXYGEN BOTTLES (FOUR)
G45 CAMERA GUN
CABIN PRESSURE SPILL-VALVE
REVISED COCKPIT
22. MARTIN BAKER EJECTOR SEATS
23. INSTRUCTOR'S FLAP AND U/C CONTROLS
24. I.F.F.
TWO (OR FOUR) 20 mm GUNS
8. MAGAZINES
9. FEED TO ST'B'D OUTER GUN
10. MAGAZINE ACCESS DOOR
ST'B'D AIR INTAKES
1. TO ENGINE
3. COOLING AIR TO AUXILIARIES
4. TO GUNS via HEATER MUFF
EXTERNAL ELECTRIC SUPPLY SOCKET
DROP TANK 100 gal
12. TANK/BOMB MOUNTING
MAIN SPAR SECTION TO RIB 8
MAIN SPAR SECTION OUTBOARD OF RIB 8
REAR SPAR SECTION
JACK E TO AP)
DIVE-BRAKE JACK AND HINGE
LINKAGE TO WHEEL-OPERATED DOOR (13)
AILERON OPERATING ECCENTRIC (20. CABLES)
OUTER-WING TANKS TOTAL 65 gal EACH SIDE (11. FILLER)
BALANCE TAB
AILERON MASS-BALANCE
GYROSYN COMPASS FLUX-UNIT
FLIGHT COPYRIGHT
A BOWBEER

The Latest Vampire Trainer . . .

a private venture and—as has so often happened before in the aircraft industry, notably with D.H.'s own Mosquito—a potential world-beater was the result.

The Trainer was given the type-number 115, and was first seen in the static show at Farnborough in 1950. By this time an initial order had already been placed. The prototype first flew early in 1951, in the hands of Geoffrey Pike, and the first production aircraft came off the line in December of the same year. Design and tooling were done by de Havilland's Airspeed division, who are also building the first run of production aircraft. Development test-flying was carried out by John Wilson and the late John Derry.

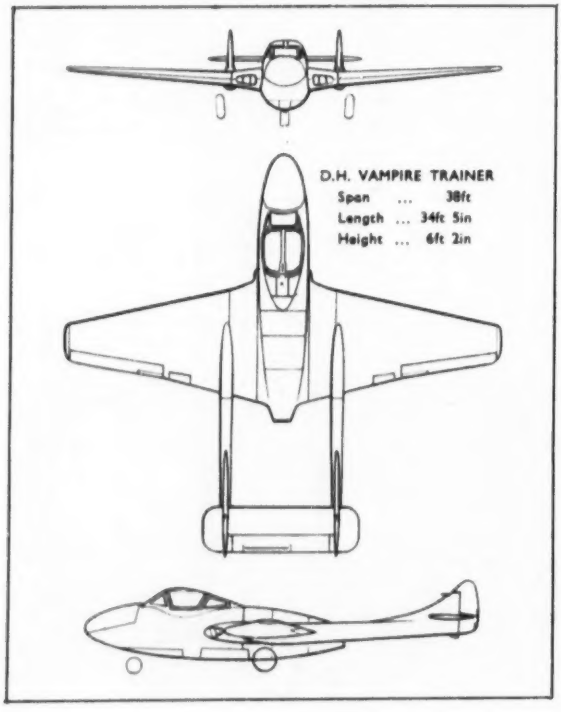
A few of the 115s are being constructed at Hatfield, but the main assembly line is at Chester, whence aircraft will be supplied to the R.A.F. and the Royal Navy, and to a whole range of other countries, including Venezuela, Norway, Portugal, Sweden, Iraq, South Africa, Switzerland, the Lebanon, and India. In addition, Australia and India are to build the machine under licence in their own factories.

The first batch of production aircraft were similar to the prototype, but after evaluation at Boscombe Down certain modifications were considered desirable and de Havillands themselves wished to incorporate others. Accordingly, future machines will embody the changes detailed below.

First and foremost, ejector seats and a new canopy are being fitted, the seats being of the latest Martin-Baker fully automatic type. The canopy not only permits ejection, but also contains far less metal than its predecessor, thus improving the pilot's view. It is distinctly more pleasing in appearance, and entry into the aircraft on the ground is facilitated. If a serious emergency occurs in the air and baling out is necessary, the canopy can be jettisoned by operating a hydraulic switch on the instrument panel: a ram starts to raise the front of the unit, and when it is about 18 degrees open the rear hinges disengage and the whole unit flies away, missing the tail by a safe margin. Hand-pump and manual operation are provided as stand-by alternatives. Once the roof has gone, all the crew need to do is to pull down the blinds of their seats—and the rest is looked after for them.

The other major modification has been to the tail, where the fin surfaces have been increased in area by continuing them further forward along the booms. In the original T.11 it was found that there was a slight tendency towards rudder overbalance; rudder travel was therefore limited, and it was then found that recovery from a spin, whilst being by no means dangerously difficult, was not as facile as was desirable in a training aircraft. The enlarged fins have permitted greater freedom for the rudders, and this in turn has made spin-recovery entirely satisfactory.

A number of other, less obvious, modifications have also been incorporated in the newest T.11s. The direct-vision panels have been re-designed to hinge up in front of the windscreen, thus dispensing with the rather untidy runners along which they previously slid (and for which, in any event, there are no points of attachment on the new canopy). These new windows can readily be operated with one hand. A single screen-wiper covering the port and central areas of the windscreen is being introduced, which should improve landing view in rain—at present one of the few shortcomings of the aircraft.



The first flight of a modified Vampire Trainer took place on April 7th. John Hanslip was the pilot; he is a production test pilot of de Havilland's Airspeed Division at Christchurch.

Undercarriage and flap controls are duplicated for the instructor, and Mk V gun-sights are fitted. Finally, a single blind-flying panel, centrally placed, is being assessed: if it proves satisfactory, it will cut down instrument costs and maintenance, whilst at the same time providing space for other equipment, such as an extra aid. The Sperry G.4.B. compass is replaced by a G.4.F. in this single-panel arrangement.

The de Havilland company believes that the revised D.H.115 is the finest advanced trainer in the world. All its handling qualities are now impeccable and the type is very highly developed as a result of thousands of hours of hard Service flying. All present production aircraft are being built to the standard shown in the drawing by Arthur Bowbeer on the previous pages. Additionally, the latest modifications—particularly those to the fins and rudders—are to be made retrospectively to the Vampire Trainers now in service.

The table of data on page 578 refers to the fully-developed aircraft. The only factor which has had any appreciable effect on performance is the increase in empty weight due to the installation of the two ejection seats. This difference, of some 120 lb, has inevitably resulted in a slight reduction in range, but not enough to impair the value of the aircraft in any way.

Speeds, endurances, ceiling and critical Mach number are scarcely affected. The modified aircraft also retains the same basic equipment and virtually the same armament and combat gear as the original T.11 currently in service.

Such, then, are the new features being provided on all but the first T.11s to enter service. Some aircraft, however—incorporating none of the modifications discussed—are already playing their part at the Advanced Flying Schools, and we hope to give an account of their activities in a forthcoming issue.

The original full description of the D.H.115 Vampire Trainer appeared in *Flight* of November 23rd, 1950.

"SERVICE TO INDUSTRY"

THESE three words express the theme underlying the range of products to be found displayed at the new London showrooms of the Firth Cleveland group of companies, at 7-9 St. James Street, S.W.1. Of the firms comprising the group, and who are represented at the new premises, Simmonds Aerocessories, Ltd., Treforest, need no introduction to readers of *Flight*; Stenor, Ltd., Richmond, Surrey, are specialists in vulcanizing machines and gauge equipment; Firth Cleveland (Machine Tools), Ltd., Wolverhampton, make boring bars, small lathes, drilling machines and other works equipment, and also have a factory devoted to jig and tool work for the aircraft and motor industries; the Firth Co., Ltd., Warrington, produce wire, mild-steel bar and solders in great variety; Whatton and Sons, Ltd., Wolverhampton, are precision engineers; and British Lead Mills, Ltd., with British Lead Alloys, Ltd., at Welwyn Garden City, are leading manufacturers of lead sheet, pipe and alloys.

Turbojet for Western Defence

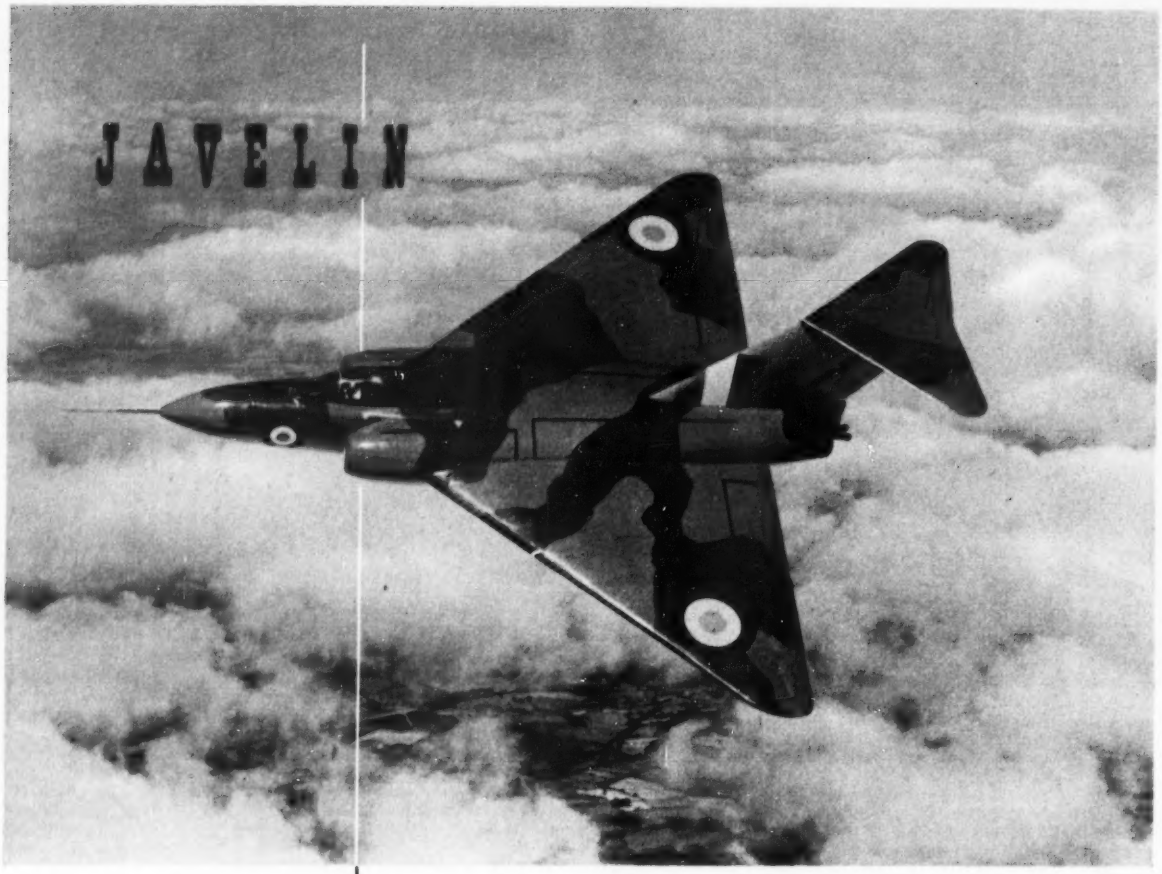
Large scale production of the Sapphire turbojet is now under way in the United States of America. The Wright Aeronautical Division of the Curtiss-Wright Corporation is building it under licence, as the "Wright J.65" — to power the Republic F-84F (Thunderstreak) fighter.

WRIGHT **J.65** — **ARMSTRONG SIDDELEY** ***Sapphire***

TWO NAMES – ONE ENGINE

ARMSTRONG SIDDELEY MOTORS LIMITED · COVENTRY

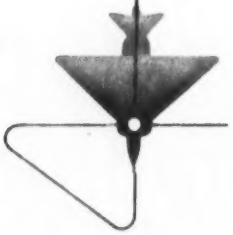
Members of the Hawker Siddeley Group



ejection seats

The Martin-Baker Mk. 2 *fully automatic* Ejection Seat fitted to the Gloster Javelin and now in production, is designed to reduce escape procedure to the minimum.

Once ejection is made, the complete sequence of releases from the seat is automatic and no further action by the occupant is necessary.



designed by

Martin -Baker
AIRCRAFT COMPANY LTD

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THE PROTEUS STORY

Dr. Hooker's Emphatic Example of the Case for the Turboprop

WE briefly recorded in an earlier issue the area meeting of the Royal Aeronautical Society, held at the Royal Fort, Bristol, at which Dr. S. G. Hooker, O.B.E., A.R.C.Sc., B.Sc., D.I.C., D.Phil., F.R.Ae.S., F.R.S.A., chief engineer of the engine division of the Bristol Aeroplane Company, spoke on *The Development of the Bristol Proteus Propeller Turbine Engine*. It is now possible to give a more comprehensive account of this occasion, which was the first joint meeting of the Bristol, Gloucester and Cheltenham, and Yeovil branches of the Society.

The chairman, Dr. A. E. Russell (president of the Bristol branch) first introduced the president of the parent society, Mr. G. H. Dowty, who began by paying a tribute to the active part played by Bristol men in the affairs of the Society. He went on to trace the short history of the area meetings scheme—this was only the second such meeting—and to give a humorously involved correlation between the history of the Royal Fort and the subject of the evening's lecture. As Dr. Hooker was so well known, he concluded, there was no need for an introduction.

Rising to face the crowded lecture theatre, Dr. Hooker remarked that his previous lecture on the Proteus had been given in Ottawa, where the pre-lecture cocktail party had resulted in an unusually enthusiastic reception for the talk which had followed.

The speaker then turned to the basic theory of the gas turbine. The main thermal cycle could be considered as that of a boiler producing hot gas under pressure, he stated: this gas could drive an airscrew, a ducted fan, or could go "out of a hole at the back." Each pound of air could produce 100 h.p. using an airscrew, or 60 lb of jet thrust in a turbojet engine, using the same amount of fuel; as the 100 h.p. could provide 260-lb thrust for take-off, the turboprop gave an enormous advantage over the turbojet in that case. The ducted fan came between these two in efficiency.

"What goes in the front must come out at the back," asserted the lecturer, in his version of the basic Newtonian principle of the conservation of momentum. Using the three laws of Newton, he then went on to prove that the propulsive efficiency of the turboprop at 500 m.p.h. was approximately 75 per cent, while that of the turbojet did not exceed 44 per cent. Even assuming a ratio of efficiencies of 65 : 44, the turboprop would use only two-thirds the fuel required by the turbojet. The position of the by-pass engine lay between the turbojet and the ducted fan.

Turboprop Advantages

Mentioning that the thermal efficiency of a piston engine was only some 30 per cent, Dr. Hooker pointed out that the efficiency of a turbojet increased with altitude and speed. There was, however, no point in designing a turbine for a turbojet engine with a pressure ratio of more than 11 : 1, due to thermal efficiency losses above that figure. The pressure ratio of the Proteus had been raised from 5½ : 1 on the original model to 7 : 1 for the Mk 3, and in general the improvement of compressor and turbine components could much more effectively be transferred into an increased efficiency or power in the case of the turboprop than for the turbojet.

Showing a diagrammatic view of the Proteus, Dr. Hooker went on to state that a 1 per cent improvement of compressor efficiency gave 2 per cent more power, for the same fuel flow; such small improvements were therefore very important. A comparison between the turboprop and the turbojet showed that the latter required 50 per cent more fuel at altitude for the same cruise performance; if power was reduced for a stand-off period, then fuel consumption for both engines increased proportionately.

After giving an illustrated description of the Proteus, the lecturer enumerated the problems which had arisen in its development. Among these were tooth interference due to high torque, oil leakage through the gearcase breather, cracking and buckling of combustion chambers subject to considerable heat and pressure differences, carbon formation on burners, and breakage of compressor blades excited by aerodynamic forces or in mechanical resonance with other components.

Compressor-blade design, Dr. Hooker commented, had been one of the least-understood phases, and had involved some intelligent guesswork. Vibration experts, if called in for advice, tended to prove conclusively that one couldn't run the engine at all; and "they would require £100,000 and ten years to find out what to do about it." It had been found in practice that a suggestion by the engineers that blades should be made of steel, not aluminium, was a good one. In theory, steel and aluminium were equally likely to break—but the steel blades, in practice, did not. On the Proteus 2, an almost universal cure for blade failures had been this change to the use of steel: then an actual disc had broken, so this was made from steel also. "This," the speaker submitted, "is why the weight of engines always increases."

Another difficulty, he continued, concerned the accuracy with which three bearings could be located in line: the practical accuracy attained had improved gradually, but to simplify the coupling in later designs one of the three bearings had been omitted.

Illustrations of typical troubles experienced were then shown, and included gear tooth "pick-up" due to ineffective lubrication, break-up of white metal on planet pin, entry guide-vane failure (vibration excited by airflow), 12th-stage rotor-blade failure (resonant with a downstream web), "pick-up" on compressor coupling teeth due to misalignment, splitting from the inner flange of a high-pressure turbine diaphragm, and carbon formation on spray nozzles.

In the tests which followed the decision to incorporate all the modifications into a new design, stated the lecturer, it had been important to test compressor and turbine separately, and not on a complete engine, in order to isolate the respective factors. Thus the compressor drove electric motors, which in turn provided a cold airflow to blow the turbine round directly, no fuel being burned. Much development took place and useful experience was gained on these two test rigs.

A considerable improvement had been effected by incorporating shrouds on top of turbine blades, to prevent gas leakage through the 0.002-in. gaps at the tops of the blades. By putting on these "roofs," a 6-per-cent gain in turbine efficiency had been obtained, which, when the turbine was fitted to a complete engine, had resulted in a power increase from 2,700 to 3,300 h.p. and a decreased specific fuel consumption from 0.8 to 0.7 lb/s.h.p./hr.

Such improvements encouraged a major redesign of the Proteus, and resulted in an overall power increase from 2,500 to 3,600 h.p. and an improvement in fuel consumption from 0.85 to 0.64 lb/s.h.p./hr.

The Proteus 3

The final result had been the Proteus 3 which "kept the good bits of the Proteus 2," and featured a shorter overall length, steel blades, and a four-stage turbine coupled in pairs, the first pair driving the compressor and the second pair the propeller.

A detailed comparison between the Mk 2 and the Mk 3 designs was then given by the lecturer. Among the Mk 3 improvements which he mentioned, in addition to those he had previously described, were the placing of the centrifugal stage immediately behind the axial stages of the compressor, thus eliminating transfer losses; the smaller first and 12th stage discs and centrifugal impellers; shorter airscrew-drive shafts; a smaller parking brake; and neater, more efficient combustion chambers which, being claimed to burn 101 per cent of the fuel, were "regarded as good."

Dr. Hooker concluded by forecasting further improvements for the future, the most significant of which would be a continued improvement in the specific fuel consumption. This could result in a considerably larger payload for the Britannia.

The first speaker in the discussion which followed the lecture was Capt. M. Luby, B.Sc., M.I.Mech.E., F.R.Ae.S., R.N. (Retd.), who, until last August, was Director of Engine Research and Development at the Ministry of Supply and is now general manager of Rotax, Ltd. He traced the life history of the Proteus from his personal experience, pointing out the lack of test facilities in the early days, and summed up the engine's development as "a good job in spite of great difficulties." He asked whether Dr. Hooker, if starting the design anew, would favour the reverse-flow principle.

In his answer to Capt. Luby, Dr. Hooker emphasized that initial Proteus design had been overshadowed by coupling problems for the Princess and Brabazon, otherwise a straight-through flow "in a Christian manner" would have been favoured. Results obtained from the test-house—"or gin palace"—had been invaluable, he stated. Other topics of discussion were the advantages of the free turbine, with gas drive between airscrew and engine, and the higher temperatures likely to be experienced in future engine developments.

In conclusion, thanks were expressed to Dr. Hooker for his exceptionally interesting lecture by Mr. D. L. Hollis Williams, vice-president of the Yeovil branch, and by Mr. A. E. Bingham, chairman of the Gloucester and Cheltenham branch, on behalf of their respective units. The joint meeting had, indeed, been well attended, over 70 having travelled from Cheltenham alone.

KEMANO-KITIMAT

Aircraft Assist British Columbia's Aluminium Plan

Air lorry : One of several Sikorsky S-55 helicopters used to airlift men and building materials. It is operated by Okanagan Helicopters, Ltd.

AIRCRAFT are being used to a considerable extent in supplying construction gangs engaged on what the Canadians call the Kemano-Kitimat Project, an undertaking which will double Canada's aluminium output and allow for considerable export of this essential metal. The project covers so large an area that engineering supervisors travel from point to point by light aircraft fitted with floats for summer landing on lake and river and with skis for winter use.

When work began over two years ago, a bush-pilot, Rus Baker, offered the services of his 1927 (repeat, 1927) Junkers. Today the aircraft in use include Norsemen, Bellancas and Cessnas, and a maintenance depot has been established at the H.Q., Prince Rupert, on the coast of British Columbia.

The main civil engineering requirement for the project is this : to construct a dam to combine several lakes into a single sheet of water of 335 square miles; with a tunnel, to reverse the flow of the Nechako River into this stretch of water; blast from 2,000ft deep in a mountain, a chamber 1,000ft long, 50ft wide and 135ft high in which to house a power plant; build a new "aluminium town" and smelter at Kitimat (an Indian village on the coast of northern B.C.); and lay 500 miles of cable between Kitimat and the power-house deep in a mountain. Nearly all the equipment for the opening of this 500,000,000-dollar enterprise was airlifted by Norsemen to the selected working sites. Heavier aircraft were not suitable for the work because of the impracticability of building landing-strips at each of the several dozen major working-points.

Roads have now been pushed through the wild coastal range to the main camps, but aeroplanes are still in use between Prince Rupert and the more distant locations. To deliver the necessary equipment to the 5,000ft-high plateau across which power cable is being laid for 500 miles would present almost insuperable difficulties without the aid of aircraft, for this is one of the most rugged parts of British Columbia, which itself is the most rugged district of Canada. Several Sikorsky S-55 helicopters, one of which is seen in the accompanying illustration, are in use for delivering materials to the construction gangs laying the power cable. They also airlift men and food supplies as required and have "brought out" men suffering from frostbite or injuries.

The project is up to schedule and, all being well, it will be completed on time.

MACARTHUR RETURNS

AFTER the smashing of Japan's sea power during the Battle of Leyte Gulf came the great seaborne assault on Luzon, northernmost island of the Philippine group. This, and the eventual freeing of the remainder of the Philippines, was covered by *Return of the Allies*, No. 21 of the B.B.C. Television film, *Victory at Sea*.

The film opened with air shots taken over Leyte Gulf, showing impressive arrays of landing craft packed bulwark to bulwark, and of massed tanks, guns and other complex equipment of modern war. Camera-gun shots of softening-up attacks on Japanese-held airfields, shipping and military installations around Lingayen Gulf were also shown. The aircraft were mostly Hellcats and Avengers.

Dramatic shots were included of *kamikaze* or suicide-aircraft scoring direct hits on U.S. ships massed offshore. Organized *kamikaze* attacks had first been made just before the earlier Leyte landings. The near-panic they caused within the U.S. Navy was not generally known of at the time and is not fully realized even yet. They restored to the Japanese an effective air weapon which they had not had since they lost their best pilots in the Solomons two years previously. In the ten months during which they operated, *kamikaze* aircraft accounted for 48 per cent of all U.S. warships damaged and 21 per cent of all the ships sunk during the war. During the Philippines campaign, 174 hits or damaging near misses were scored out of 650 attempts.

Episode 22 carried the war in Europe to its victorious conclusion. Sequences of Russian forces in action, shown for the first time in the series, included brief glimpses of SB-2s, PE-2s and of the widely used IL-2 Stormoviks bombing targets in the Crimea. Retaliatory attacks by Ju 87s against Russian shipping were also shown.

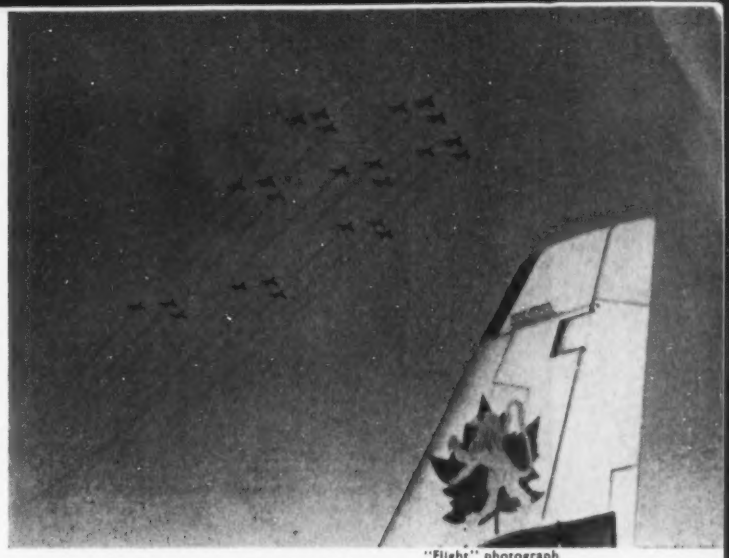
Of the battles in the west, air sequences were confined to two shots of B-17s in massed formation and of air shots showing gutted German cities. One of the B-17 shots looked as if it was taken from a Hollywood film; the other was obviously the real thing.

A START FOR A GHOST

Although the main problems associated with starting gas-turbines have largely been overcome, design of the necessary high-powered ground equipment is still a task for specialists. Lincoln Electric Co., Ltd., are responsible for the starter pictured here with a Comet 1A of the R.C.A.F. Units of this type have been adopted by B.O.A.C., C.P.A. and A.N.A. A Comet starter of Lincoln manufacture was incorrectly attributed to another company on page 542 of last week's special issue of "Flight," which marked the anniversary of scheduled Comet services.

CANADIANS at ZWEIBRÜCKEN

A Fine New Base Handed Over by the French



"Flight" photograph

Sabres from Zweibrücken and Gros Tenquin fly across the new base. In the foreground are the impressively emblazoned fin and rudder of one of the machines of 427 "Lion" Squadron.

THE Canadian intention, expressed last August, to have four wings of fighters flying in Europe by 1954 is fast becoming reality. Already No. 1 Wing at North Luffenham and No. 2 at Gros Tenquin have made their Sabres and maple-leaf roundels no unfamiliar sight in the skies above Europe; and on April 26th attention was focused on yet another of the R.C.A.F.'s N.A.T.O. units—Fighter Wing No. 3, now based at Zweibrücken, in the French Zone of Germany.

The occasion was the official handing-over of the airfield at Zweibrücken by the French to the R.C.A.F., and the placing of the unit at the disposal of Allied Air Forces, Central Europe. The occupying wing of F-86Es comprises Squadrons 413 (from Bagotville, Quebec), 427 (from St. Hubert, Quebec), and 434 (from Uplands, near Ottawa), which flew over from Goose Bay by way of Keflavik and Prestwick, arriving at the new Saar base early in April. Squadron commanders are, respectively, S/L. W. I. Gordon, S/L. C. L. V. Gervais, and F/L. H. S. Tetlock.

During the delivery flight, two Canadian North Stars of 426 Thunderbird Squadron had flown squadron ground personnel and equipment to the *en route* bases and Zweibrücken, in the long-stage hops which gave the flight its code name, "Leapfrog 3."

Many distinguished NATO representatives, including Lord Ismay (Secretary-General of the North Atlantic Council), were present for the handing-over ceremony, which began with a fly-past by Sabres from Zweibrücken and Gros Tenquin, and by F-84s of Squadrons 1 and 11 of the French Air Force. On parade in front of the large hangar were several hundred Canadian airmen and French troops, while on the raised platform, flanked by the French tricolour and the Canadian flag, were representative guests from many countries.

The base was officially handed over by M. François-Poncet, the French High Commissioner in Germany. After the Franco-Canadian agreement had been signed by Gen. R. Noiret, C.-in-C. French Forces in Germany, and A. Cdre. W. R. MacBrian, A.D.C. No. 1 Air Division (and endorsed by M. François-Poncet and Mr. T. C. Davis, Canadian Ambassador to the Federal German Republic) a reply on behalf of the Canadian Government was made by the Hon. Brooke Claxton, Canadian Minister of National Defence.

He began by re-emphasizing the close ties between France and Canada, mentioned by the High Commissioner, and congratulated the C.O. of No. 3 Wing, G/C. A. C. Hull, and his squadrons on successfully completing Operation Leapfrog 3. "The fourth Wing," he continued, "is now being organized and is receiving its final training so that it will be able to take its place at Solingen, not far from here, and this will be accomplished by the planned date, later this year. We have also established the Air Division Headquarters at Mercy-les-Metz, some four miles out of that historic military centre."

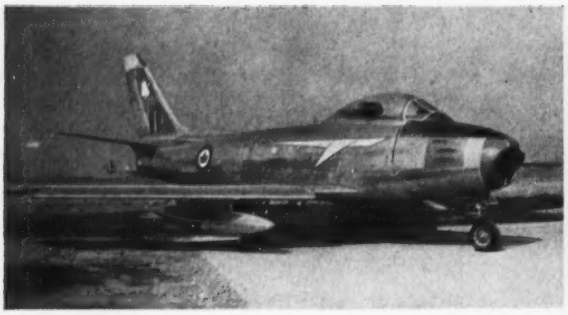
Mr. Claxton went on to mention the Canadian Sabres being built for Britain, and the flying training given by Canada to the aircrews of NATO countries. "Altogether, we have so far trained over 1,600 pilots and navigators from other countries, and today there are another 1,300 undergoing training."

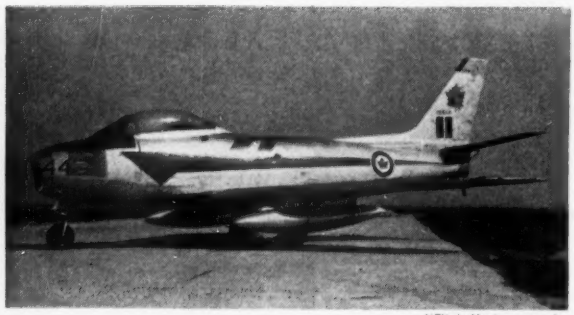
The Minister concluded: "For the Government of Canada and the Royal Canadian Air Force, in accordance with the North Atlantic Treaty provisions, I now commit this Wing to the Supreme Command of the North Atlantic Nations in Europe, with the strong belief and confidence that this will be another step in the path of progress and in the guarding of peace, to build firmly the foundation of our stand together for freedom, for the maintenance of security, and for the welfare and happiness everywhere of free peoples."

In a short closing speech, G/C. A. C. Hull, commanding officer of the Zweibrücken Wing, thanked all who had co-operated to make the inauguration of the new activity a success.

A tour of the station following the ceremony enabled visitors to see for themselves how excellently the station had been built, and how comprehensively equipped. Constructed in less than two years by German labour to the instructions of French engineers, the airfield and station buildings had been equipped and furnished by the R.C.A.F., using Canadian, British and Continental European material—truly a joint achievement. The buildings (which include a 55-bed hospital, a gymnasium and a theatre) are modern and spacious, and must make the base one of the best equipped of the newly built NATO airfields. Speaking

The Hon. Brooke Claxton speaking at the handing-over ceremony. (Seated, left to right) Gen. Jouhaud, C.O. 1st French Air Division; A.V-M. J. L. Plant (R.C.A.F.), A.A.F.C.E.; Lord Ismay; Gen. R. Noiret, C.-in-C. French Forces in Germany; G/C. A. C. Hull; M. Andre Francois-Poncet; Mr. T. C. Davis; A. Cdre. W. R. MacBrian, and Gen. Pierre Fay, Chief of Staff, A.A.F.C.E.





"Flight" photographs

Squadron markings at Zweibrücken. (Left) The white and blue insignia of 434 "Bluenose" Squadron, with the original "Bluenose" yacht on the fin. Resemblance of fuselage badge to B.O.A.C.s Speedbird is doubtless purely coincidental. (Right) The insignia of 427 "Lion" Squadron comprise long red fuselage flash, and lion design on the fin (see also photograph on page 583).

CANADIANS AT ZWEIBRÜCKEN . . .

with the pilots, one received an enthusiastic confirmation of its qualities, as both a base from which to fly and a place in which to live. Flying weather, also, had proved exceptionally good.

The station is situated on a plateau just outside the town of Zweibrücken, and its white concrete dispersal tracks and station buildings, and reddish-brown bulldozed earth, now spread over what was previously woodland and farms. In the background lies a constant reminder of an earlier defence scheme, for the airfield was built over part of what was the Siegfried Line—broken pill-boxes of which can still be seen only a few yards across the perimeter fence from the station's two churches.

K. T. O.

PAPERS ABOUT PLASTICS

THE second British Plastics Exhibition (Olympia, London, June 8th-18th) will again be concurrent with a convention, at which no fewer than 22 papers will be read by specialists in the various fields of plastics manufacture and use.

It may be said that almost all these lectures will, to a greater or lesser extent, be of interest to the aircraft industry, but at least half-a-dozen of them are of more direct concern. Five of these will be given on Wednesday, June 10th, the two sessions on that day being devoted to reinforced plastics.

On the morning of that day the following papers will be given:—*Surface Chemistry and Adhesion of Glass and Plastics*, by H. Cole, M.A., F.R.I.C., F.S.G.T., of Pilkington Bros., Ltd.; *Plastics Containing Asbestos as a Reinforcing Filler*, by J. E. Gordon, B.Sc., P. H. H. Bishop, B.Sc., and P. L. McMullen, D.L.C.(Aero Eng.), all of the R.A.E., Farnborough; and *A Critical Survey of Commercial Low-pressure Laminating Resins*, by V. E. Yarsley, D.Sc., F.R.I.C., F.P.I., and A. G. Goodchild, B.Sc., A.R.I.C.

During the afternoon session the papers will be as follows:—*Some Considerations in the Design and Manufacture of Structures in Glass-reinforced Plastics*, by G. C. Hulbert, B.Sc., of the Bristol Aeroplane Co., Ltd.; and *Some Problems Associated with the Design and Manufacture of Asbestos-reinforced Plastics*, by D. S. Bancroft, A.F.R.Ae.S., of F. G. Miles, Ltd.

The sixth lecture which may well be of interest to certain aircraft constructors will be given on the afternoon of Thursday, June 11th, when R. A. G. Knight, B.Sc.(Eng.), M.I.Mech.E., of the Composite Wood Section, Forest Products Research Laboratory, will speak on *The Durability of Adhesives for Wood*. Also worthy of note, incidentally, is the morning-session paper on the same day, which, it is stated, "will interest all users of technical products made from plastics": its title is *The Durability of Plastics under Post Office Conditions*, and it will be given by A. D. W. Downes, B.Sc., F.R.I.C., of the P.O. Engineering Department research branch.

In the exhibition itself, over 80 exhibitors will be represented.

TOWARDS AIR SAFETY

ON April 22nd, at the last meeting of the spring lecture-session of the Graduates' and Students' Section of the Royal Aeronautical Society, Mr. Harold Caplan, D.C.Ae., a graduate of the Society, spoke on "Aircraft Accident Investigation."

The lecturer, who is employed in the Air Safety branch of the British Aviation Insurance Co., Ltd., began by stating the ideal objects of aircraft accident investigation, and by distinguishing basically between investigation and inquiry. Defining the various types of investigators, he pleaded for those present "not to shoot the insurance man"—he *was* doing his best, and his object was *not* to avoid meeting claims.

The regrettable gap between the occurrence of accidents and their reporting and investigation, due to inadequate international regulations, was then emphasized by the speaker. He went on to show a representative selection of accident photographs, one of which, illustrating the "raw material of investigation in India," showed a remarkable piece of wreckage, through which jungle creepers had grown in a matter of hours. After outlining a typical investigation, Mr. Caplan expressed his doubts concerning the indiscriminate use of statistics, by co-relating the number of aircraft accidents to the northern Irish suicide-rate and the number of state executions in England.

What was needed, concluded the lecturer, were (1) the prompt reporting of all accidents and incidents, (2) a full scientific investigation of all factors, and (3) a wide publication of results. A new attitude to human errors involved was also necessary, as part of a comprehensive study of "human engineering."

Mr. Walter Tye, O.B.E., B.Sc., F.R.Ae.S., of the Air Registration Board, opened the discussion by questioning a suggestion by Mr. Caplan that investigators should be able to follow-up the results of their investigations. How, he asked, could this fit in to the present system? It could not, admitted the lecturer, but ideally an investigator should have wider duties: "In my Utopia, there is a place for such a man." Other questions concerned accident information from Russian-controlled countries, relative crash-safety in different parts of an aircraft (the lecturer admitted that he personally always sat near the tail), backward-facing seats ("this is a hot subject"), crashworthiness of various basic designs, factors affecting aircraft insurance rates, and possible improvements in altimeter design.

In his closing remarks, the chairman, Mr. J. G. Roxburgh, Grad.R.Ae.S., referred to the need not only to minimize the effect of accidents, but also to prevent their occurrence.

FORTHCOMING EVENTS

May	9-10.	Aéro Club du Finistère: Brest and Côte des Légendes Rally.
May	13.	R.Ae.S. Chester Branch: Annual General Meeting.
May	14-17.	American Helicopter Society: Forum, Washington.
May	14-22.	F.A.I.: 46th Annual Conference, The Hague.
May	16.	Wolverhampton Aero Club: Goodyear Trophy Race and Display.
May	20.	Aircraft Recognition Society: "Supersonic Flight Problems," by Prof. A. A. Hall, M.A., F.R.Ae.S.
May	21.	R.Ae.S.: All-day Meeting on Aeronautical Acoustics (jointly with the Acoustics Group of the Physical Society).
May	23-25.	Aéro-Club d'Epernay: Champagne Rally.
May	23.	Derby Aero Club: Display.
May	25.	S.S.A.F.A.: Display, Yeadon.
May	25.	Air Display, Elmdon, Birmingham.
May	25.	Women's Junior Air Corps: Display, White Waltham.
May	29.	R.Aux.A.F.: Officers' Coronation Ball, London.
May	30.	Auster Flying Club: Ragosine-Auster Homing Trophy.
May	30.	Swansea and District Flying Club: Display and Race.
June	5-7.	Yorkshire Aeroplane Club: International Rally.
June	6.	Leicestershire Aero Club: Coronation Air Display.
June	7.	Aero-Club d'Italia: Rome Grand Prix.
June	8-18.	British Plastics Exhibition and Convention, Olympia, London.
June.	11	R.Ae.S.: Ninth British Commonwealth and Empire Lecture, "Problems in Development of Air Transport in West Africa," by Sir Hubert Walker, C.B.E.
June	13.	"At Home," R.N. Air Station, Lee-on-Solent.
June	13-14.	Aero-Club d'Italia: Air Tour of Sicily.
June	13-14.	Rhodes Centenary Air Display and Rally, Salisbury, Rhodesia.
June	14.	Aéro-Club de Tangier: Tangiers Rally.
June	14.	R.Ae.S.: Garden Party, Hatfield.
June	15.	Coronation Naval Review.
June	16.	I.C.A.O.: Opening of Seventh Assembly, Brighton.
June	17.	Women's Engineering Society: Annual General Meeting.
June	19.	Institute of Navigation: "Accuracy of Wind Forecasts for Aviation," by C. S. Durst and D. G. Harley.
June	19-28.	Zurich: British Chamber of Commerce "Made in England" Exhibition (inc. Aviation).

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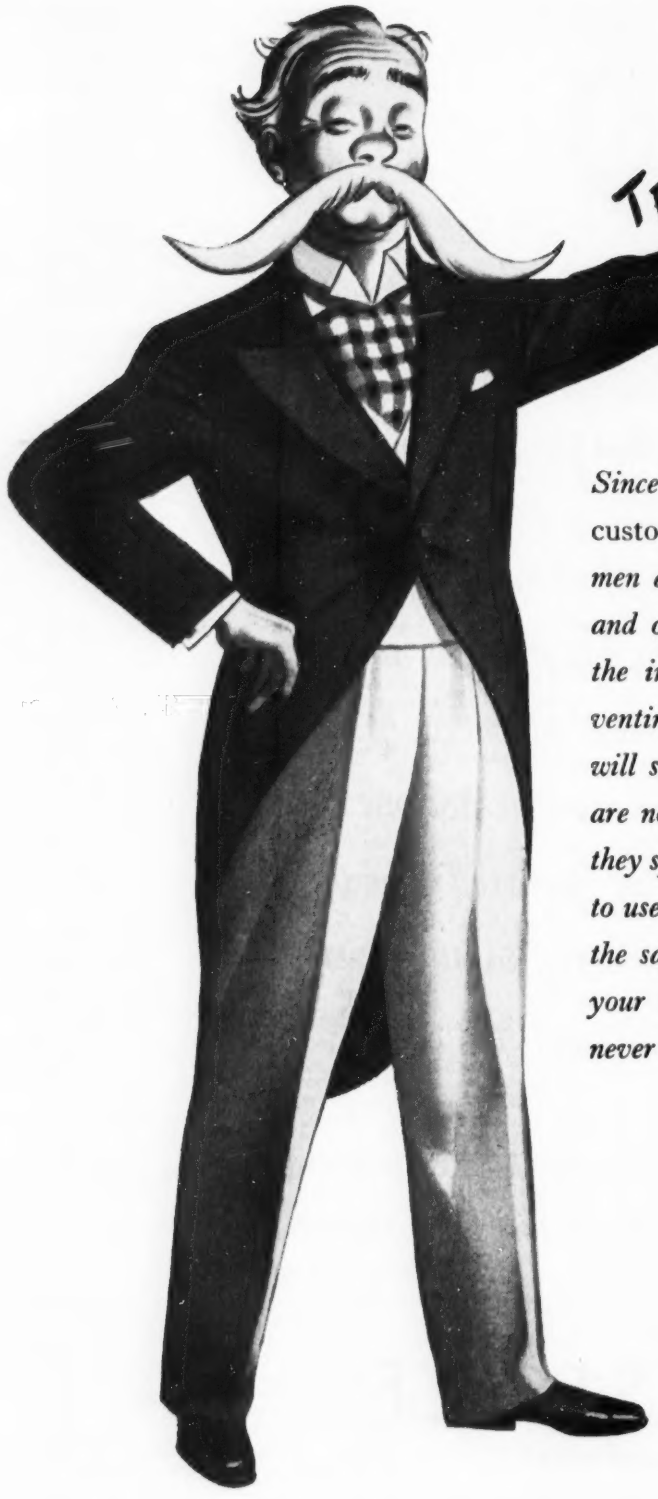

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CLUB AND GLIDING NEWS

NEXT major event on the Vintage Aeroplane Club calendar is the West London Trophy Race on July 18th. The exact course has not been finally decided, but will probably consist of a short closed circuit, similar to that of last year. A novel idea is the photographic competition being arranged for this meeting; with co-operation from non-competing pilots, scope for some good air-to-air shots is anticipated.

A PROCTOR 3, a Whitney Straight, and two Geminis, flown by British private owners, are among the aircraft taking part in the International Rally of Brest and the Côte des Légendes at Guipavas Airport, Brest, this week-end on the occasion of the Brest Fair. The meeting is being organized by the Finistère Aéro Club, and among the contest regulations appears a neat grading in Gallic courtesy. In the case of a dead-heat, higher placings are to go in order to (i) foreign competitors, (ii) the competitor whose base is farthest away, (iii) women pilots, (iv) the youngest pilot, and (v) the oldest pilot.

REDHILL, once again, were favoured with good visibility and not too much wind for their dawn patrol on April 26th. Some cloud at between 2,500ft and 3,000ft was sufficient to provide a small amount of cover for the attackers—subject, of course, to Air Regulations. This, the club's first patrol of the season, proved even more popular than previous meetings of this kind. Fifty-three visiting aircraft arrived, the first—at 0901 hours—being an Auster from Croydon, pilot Walters, followed within a few moments by some six or eight more.

Visitors came from a number of home bases, including Rochester, Broxbourne, Elstree, Southampton, Croydon and Gatwick, the longest flights being made from Coventry in a Tiger Moth and a Gemini, both of which penetrated the defences unobserved. A total of only eight visiting aircraft were able to claim free breakfasts, the defences having been strengthened since last year. The Redhill club provided four Magisters and three Austers; one Gemini, one Messenger, two Proctors and one Tiger Moth were flown by private owners; and one Tiger Moth and two Magisters came from the Popular Flying Association—a total of 14 defenders. In all, some 190 breakfasts were served.

THE Wiltshire Flying Club now has available for members' use a total of 17 aircraft, 14 of which are actually owned by the club. Mr. F. J. Baylis, previously company secretary of the club, left on April 17th to take up a new appointment, and two further flying instructors—Mr. D. Proctor and Mr. P. Lockwood—have been appointed. The total instructional staff now numbers six, two of whom perform part-time duties.

THE present 530 hours' flying total for the year was not sufficient, stated Mr. R. J. B. Pearse, secretary of the Plymouth Aero Club, at the club's recent annual meeting; at least another 150 hours should be aimed at. Sir Arthur Hollely was re-elected chairman, and committee vacancies were filled by Mr. D. P. Fitzgerald and Mr. T. Nicholls.

CONGRATULATIONS to Sgt. Stanley Bradbury of No. 1855 Royton Squadron, A.T.C., from Throttle-Bender Fred Dunkerley, chairman of the Lancashire Aero Club. The occasion was the presentation of the club's George Pemberton Trophy to Sgt. Bradbury, following his excellent performance in the junior landing competition.

ASSOCIATE membership of the Royal Aero Club at the beginning of April was just under 1,900, including a number of overseas members. Applications for this grade of membership can still be accepted, and inquiries should be addressed to: the Associate Members' Secretary, Royal Aero Club Aviation Centre, Londonderry House, 19, Park Lane, London, W.1 (GROsvenor 1246, Ext. 29).

THE second annual meeting of the Oxford Gliding Club was held at Jesus College recently. Professor G. C. Varley, chairman and C.F.I. of the club, stressed the need for more members and stated that 65 had been trained this year. The club possessed four soarable machines, and 2,381 launches on 114 days' flying had been achieved. A list of flying regulations for the club was formally adopted, and committee members Stafford, Allen, Varley, Herbert, Stow, Gibbons, Goodall, Graham, Turner, McLeod, Wingfield and Parsons were elected.

MR. C. R. DAVIS and Miss B. M. Grey are both becoming well known as gliding enthusiasts. Mr. Davis, who learned to fly powered aircraft in India, received his sailplane training at Dunstable and at Lasham, where Miss Grey qualified for her "C" certificate a few weeks ago; she is the daughter of veteran aviation journalist C. G. Grey. Their engagement was recently announced.

NATIONAL GLIDING CHAMPIONSHIPS, 1953

THE 1953 National Gliding Championships are to take place at Great Hucklow, Derbyshire, from July 25th to August 3rd, and the regulations have now been issued by the British Gliding Association. The decision to hold the contest at the site of the Derbyshire and Lancashire Gliding Club for the fourth time in succession has special interest this year, because this site may well be the venue for the 1954 World Gliding Championships. At the forthcoming F.A.I. meeting the British representative will put forward our claim and, if it is successful, the World Championships will be held at Great Hucklow in the summer of 1954. The National Championships this year may thus be a rehearsal for both pilots and organization.

Entries are again divided into two classes—the team class, in which each glider must score points while being flown by more than one pilot, and the individual class, in which one pilot must do all the flying.

Before each day's flying the organizers will set one of three tasks :—(i) A flight over a course set by the organizers, which may be straight, out-and-home, or round a triangle. (ii) A flight to a goal nominated by the pilot. (iii) A straight distance flight in a direction chosen by the organizers.

No marks have been given for duration for several years, and for the first time no marks are to be given for height this year. Marks are to be given for distance covered with due regard to the goal, and (in the first task) for speed. The marking system is rather complicated, but it may be noted that the speed bonus awarded to pilots reaching their goal in task (i) is 25 per cent for the slowest glider, but may reach 100 per cent for the fastest, and the penalty imposed for failure to complete a fast-flown course will prove severe.

The task (ii) formula ensures that the achievement of a moderate goal is rewarded to the same extent as a longer flight which fails to reach an over-ambitious goal, while marking for task (iii) is related solely and directly to distance.

The marks scored by each glider will then be increased by a handicap bonus which is zero for the Sky and Weihe, 10 per cent for Olympia class and 33⅓ per cent for gliders with aspect ratios of 14 and below. Finally, all marks will be increased by a factor which brings the highest mark on that day to 100. (This ensures that a good performance in poor weather receives due recognition.) It seems regrettable that this last factor is not to be calculated separately for the individual and team classes; with the present method the final result in the team class may well be influenced by performances in the individual class.

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns; the names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

Manchester Memories

WHILE offering congratulations on Part 1 of your history of No. 207 Squadron (April 17th), may I remark what nostalgia was induced by mention of this unit's stirring battles against the aircraft with which it was at one time equipped?

I refer, of course, to the Manchester. Although I was in a competitive department (No. 83 Squadron at Scampton), I well recall the awe and trepidation with which the aircrew of 5 Group looked upon the Manchester. Your article mentions the exploit of a 207 captain who successfully returned from Berlin on one engine. This feat is legendary in 5 Group and I believe it was followed by a decoration. If so, never was a "gong" more richly deserved. (Incidentally, how did he *get* to 18,000ft in a Manchester?).

My own experience of Manchester single-engined performance commenced when a starboard engine blew-up on local flying. The resulting descent was at a gliding angle approximating to a brick in free flight, and terminated in a ploughed field somewhere near Nottingham.

Other diverting incidents during a hundred hours and ten operations on Manchesters included a complete shearing of all port propeller retaining bolts (fortunately at the end of the runway); a take-off with "2,800 r.p.m. port and 4,000 starboard"; the sudden shedding of a fin and rudder in flight; the mysterious disappearance of all the fabric from the stabilizer after a night cross-country; and the routine, when carrying six 1,000-pounders, to "lob one off" over the Friesians in order to remain above 18,000ft. Then there was the time a c.s.u. gave up the ghost over Essen. The resulting howl must have terrified the ground defences. It certainly shook us!

Later generations of aircrew, cruising in Lancastrian comfort at 20,000 or so, never knew how interesting life could be, dodging the Happy Valley flak at eight or nine thousand feet and wondering what was going to fall off next.

And all this took place after the time when, according to your article, the Manchesters had "seemingly decided to behave themselves"!

Belfast. J. R. BUSHBY.

Frontier Incident

THE sight of the late W/C. Pink's poem in *Flight* (W/C. A. F. Hobbins' letter in your issue dated April 10th) took me back to a morning at Tank, in 1925, when an enterprising erk retrieved a typewritten copy of it from the wing commander's waste-paper basket.

With the speed that such a find warranted, it was immediately put into circulation through the squadron's usual underground channels. Its reception was ribald in the extreme, and within a remarkably short space of time the following "comment" was in circulation :—

O Wingy Pink! O Wingy Pink!
What awful things your brain does think!
This awful slush, these sobs and sighs,
Brings tears to the eyes of them what flies!
When naughty words like "hell" and "blazes"
Flash before their spellbound gazes,
They think how he'll laugh—that local Khan—
When he reads Pinky's Piece in Waziristan!

Shortly after the conclusion of Pink's War—as that particular Frontier incident came to be known—the wing commander's poem appeared in one of the Indian papers, but I cannot recall ever having seen the above in print. I doubt if I ever shall now.

For the accurate record, incidentally, the poem was written in 1925, and not in 1924 as stated. The operations concerned took place in the spring of 1925 and marked the first occasion on which the R.A.F. undertook large-scale operations against the tribesmen, as distinct from co-operating with the Army.

Egham, Surrey. F. E. CHASEMORE,
(Late No. 5 Squadron).

[We take this opportunity of remarking that the signature of the April 10th letter should have read, as above, "A. F. Hobbins." Our apologies to the officer concerned.—ED.]

Helicopter Models

IN your issue of February 6th, you published a photograph of a flying model of a Sikorsky S-55 helicopter driven by torque reaction, accompanied by a note ("Rotary Ingenuity") on this subject.

It might interest you that this system was tried out in Israel about half a year earlier on a model of the Sikorsky S-51 helicopter, constructed by Mr. Jacob Lore of Ra'anana, Israel, and powered by a McCoy 29 4.8 c.c. glow-plug miniature engine. The driving system was exactly similar to that on the S-55 shown by you, though the motor was mounted externally, the driving shaft of the rotor, carrying the motor, being adjustable in elevation. Autorotation was accomplished by dihedral change of the blades owing to spring action, this changing the pitch to a negative value. The model first flew on July 16th, 1952.

Jerusalem, Israel. N. KADMON.

New Zealand Crop-dusting

I WAS surprised to see no mention of the Royal New Zealand Air Force Bristol Freighters in your article on Crop-dusting, in the April 10th issue.

As you are no doubt well aware, two of the several rôles for which these aircraft are equipped are those of supply-dropping and crop-dusting, special hatches in the roof being standard equipment for filling the three large internal hoppers.

Bristol. R. O. LYON.

More History for the Record

I WAS interested in Mr. Stewart Blundell's letter from Australia, but as he seems uncertain on one or two points here is a comprehensive re-echo :

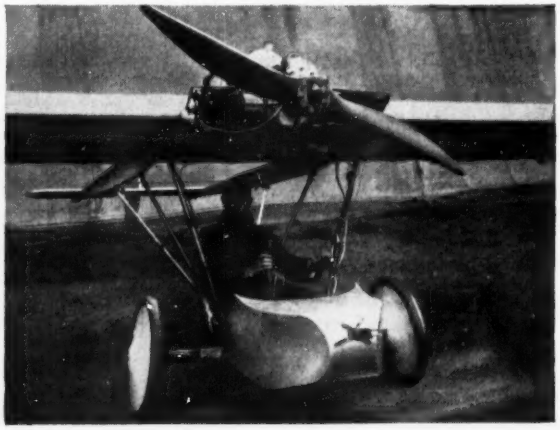
The aircraft was the B.A.T. F.K.28 Crow which was produced in 1920 by British Aerial Transport G.B., Ltd. (to give "B.A.T." in full). The firm was formerly known as Youcques Aviation Co., formed in 1917, and ended on December 31st, 1919. General Aeronautical Contracts, Ltd., took the works over after their own had been destroyed by fire (28.11.20).

The F.K.28 was the seventh design produced and appeared in the interval. It was a light, high-wing, single-seat monoplane with a single fin and rudder held on two rectangular-section box booms set fairly close together. A 35/40 h.p. A.B.C. Gnat engine driving a tractor airscrew was mounted, uncowled, on the front of the centre section above which was the fuel tank and magneto. Below, a wicker-bound basket-type bucket seat, with arms, was slung on six rods. The pilot also had protection from a small "streamlined" nacelle. A nose pitot tube was fitted (a feature of the Douglas Skystreak) and some ample wheels which seem to have belonged to another aircraft.

As a matter of interest, the designs of Mr. Fred Koolhoven were spread over several firms for which he designed aircraft. F.K.s 1 to 17 were definitely built or held by Sir W. G. Armstrong Whitworth Aircraft, Ltd., of Gosforth-on-Tyne. F.K.s 18 to 22 are rather a mystery. A print of a photograph of the F.K.28 is enclosed in the hope that someone might know the young man and what registration was carried on the machine.

Parkstone, Dorset. JOHN G. GAYLARD.

[We also have, awaiting publication, a long letter from Mr. J. M. Bruce on the same subject.—Ed.]



The photograph of the B.A.T. F.K.28 Crow referred to by Mr. J. G. Gaylard.

THE INDUSTRY

America's Magnesium Exposition

OVER 26,000 visitors attended the first International Magnesium Exposition, held recently in Washington. Two British firms, Magnesium Elektron, Ltd., and Essex Aero, Ltd., were represented on commodious stands so that, apart from the stimulus it gave to the magnesium industry in general, the exhibition also served to make known British progress in the magnesium field to American technicians, and to introduce American achievements to British experts.

Beside examples of the products of their licensees in Europe, the Magnesium Elektron firm featured a research exhibit of their new ZT1 alloy, together with ZT1 castings for Napiers and a Dowty Z5Z main undercarriage leg casting (both by Sterling Metals, Ltd.), and a canopy for the D.H. Sea Venom made by J. Stone and Co., Ltd.

Apart from an all-magnesium Allard car body, and two products —the hospital "Magbed" and stackable "Magchairs"—which have met with considerable success in this country, there were a number of Essex Aero components of particular interest to the Service visitors. They included aircraft fuel tanks, a walkie-talkie radio case and the 40- and 80-watt wireless carriers now going into service in the NATO forces.

Aircraft tanks shown by this Gravesend firm included a 150-gallon fuel tank for a Sunderland, and immediately alongside was a similar tank that had been continuously exposed to both industrial and sea-air atmospheres for 11 years, unprotected except by its standard varnish; it was still fuel-tight. Other Essex Aero exhibits which attracted attention included a new form of construction in light-alloy sheet; this has also been on view at the British Industries Fair, on which we shall comment in our next issue.

Among some very advanced aircraft exhibits by American firms were a Northrop experimental aircraft built largely of magnesium; a cast wing for Northrop, and a fabricated wing; a B-47 tail-cone; a freight-pannier for an XC-120; and the 1,237 m.p.h. Douglas Skyrocket, most of the fuselage of which is of magnesium alloy.

Mrs. O. M. Wadlow.

Mr. J. W. P. Angell.

New Miles Directors

THE growing scope of the activities of F. G. Miles, Ltd., of Shoreham, is indicated by the appointment, announced recently, of two new directors. They are Mr. J. W. P. Angell and Mrs. O. M. Wadlow.

Jack Angell, as he is widely known to the aircraft industry, has been manager of the company's Shoreham division from its inception in 1951. In 1938 he left the Bristol engine division to join Miles Aircraft, Ltd., at Reading as inspector in charge of the experimental department. He became, in turn, assistant service manager, manager of the Reading development unit and, finally, chief technical engineer. He was closely associated with the Messenger, the Gemini, the Aerovan and the development of the Miles Merchantman.

When Miles Aircraft, Reading, closed in 1948, Jack Angell went to de Havillands as technical manager (South Africa) but three years later he returned to join the new Miles organization which had been created at Shoreham Airport.

Mrs. Wadlow has been associated with the company since its Reading days and has been its secretary since it began operations at Redhill. She was originally destined for a Civil Service career, but the aircraft industry won the day and she joined the Miles aerodynamics department at Reading. She has had a large part in the business activities of the company and it is in this connection that she now takes her place on the Board.

The plastics division of F. G. Miles, Ltd., at Redhill is shortly to move to Shoreham and plans are in hand to consolidate the activities of this side of the business.

IN BRIEF

Net 1952 profits of the Bristol Aeroplane Co., Ltd., announced last week, were £563,829 (1951, £566,573), after charging taxation at £922,921 (1951, £941,455). The annual general meeting takes place on May 21st.

* * *

Well known in earlier years as an outstanding competitor in international motor-cycle races, Mr. H. G. Tyrell Smith, B.Sc., has left the Triumph Company (where he was quality control engineer and, latterly, development engineer) in order to join the Tropical Preservation Co., Ltd. This company's main interests lie in the preservation and packing of components and complete assemblies for the aircraft and other industries.

MAJOR J. VIVIAN HOLMAN, A.F.R.Ae.S., M.I.Ae.S., F.Inst.D., has been appointed to the Board of Redep, Ltd., research, development and production engineers. Well known in the aviation industry for many years, Maj. Holman is a vice-president of the Air League and a member of several aeronautical committees; he is also on the board of Bryans Aeroquipment, Ltd.

The Goodyear Tyre and Rubber Co. (Gt. Britain), Ltd., announce the resignation of A. Cdre. John Oliver, manager of their aviation sales department since March 1946. A pilot who has flown without a break since 1915, during the last seven years he has been a familiar figure with the various Goodyear aircraft, and he intends to continue private and sporting flying. A. Cdre. Oliver will be starting activities on his own account, which he hopes will keep him in contact with his many friends in the industry. He is also joining a well-known firm of insurance brokers and underwriters, Robert Bradford and Co., Ltd., who are extending their Midland interests.

For the year ended July 31st, 1952, Boulton Paul Aircraft, Ltd., announce a profit of £107,744 (previous year, £94,022) before provision for taxation.

* * *

C.B. Helicopter Hire, Ltd., announce a change of title to Helicopter Sales (C.C.), Ltd., and of their office address to Old Mill Road, Hunton Bridge, Herts. They also state that in addition to sales of Hiller helicopters—20 are now being delivered for the Royal Navy—they are now handling all types of second-hand helicopters.

* * *

The de Havilland Aircraft Co., Ltd., announces the appointment of Mr. R. G. McCoy, B.Sc., A.F.R.Ae.S., as deputy service manager. He will be responsible to Mr. A. J. Brant, a founder-member of the company who has been responsible for the world-wide servicing organization Mr. McCoy was for eleven years with Imperial Airways and the B.O.A.C., holding several responsible positions in England and overseas; latterly, he was for three years general manager of Central African Airways.

* * *

Increasing demand for their springs, both from Home and overseas, has led Geo. Salter and Co., Ltd., to acquire an additional factory—permitting modern "flow" production—on a 3¾-acre site at Smethwick, Staffs. This will be the first time that any part of the Salter manufacturing organization has moved outside the boundaries of West Bromwich, Birmingham, since early in the 19th century, when the business, founded by Richard Salter in a cottage in Bilston 193 years ago was transferred to premises in the town. The new acquisition will ultimately allow the existing West Bromwich factory to be modernized.

* * *

Referring to a recent description of a new ground-starter unit, Auto Diesels, Ltd., quote figures for their own (Crompton Parkinson/Auto Diesels) products. Stating that their equipment is in airfield service for the world's largest and fastest aircraft, they remark that their most recently constructed unit is a diesel engine driving two generators giving (continuously) 450 amp at 112 V and 750 amp at 28 V; peak currents of 1,000 amp (112 V) and 2,000 amp (28 V) are available, while simultaneous outputs for 28 V servicing and 122 V starting are permissible up to 112 kW.

CIVIL AVIATION

LOSS OF A COMET

WITH deep regret *Flight* records that a B.O.A.C. Comet crashed near Calcutta on May 2nd with the loss of 43 lives. For nearly five years the Corporation's aircraft have flown without any accident involving loss of life among passengers; it is the more lamentable that this fine safety-record has been marred by the loss of one of B.O.A.C.'s new Comets on the precise anniversary of their introduction to service last year.

Comet G-ALYV, the aircraft concerned, was operating a scheduled service from London to Singapore. At 1059 hr G.M.T. on Saturday, carrying 37 passengers, including one infant, it took off from Dum Dum Airport, Calcutta, to fly the 820-mile stage to Delhi; six minutes later the Comet reported that it was climbing on track but no further messages were received. Ground and air searches were launched, and a B.O.A.C. York located wreckage near Jugalgari, a village some 25 miles north-west of Calcutta, early on Sunday morning. Reports say that parts of the aircraft were found over an area of eight square miles, suggesting disintegration before impact with the ground. It seems certain that the Comet was flying below 10,000ft when a sudden emergency occurred, giving the crew no opportunity to send any message. The most probable of unofficial theories advanced so far is that the aircraft encountered extreme turbulence, since there were known to be scattered thunderstorms on its route.

Representatives of the M.C.A. and B.O.A.C. arrived at Calcutta by Comet on Monday to assist the Indian authorities in their inquiry, and members of the de Havilland Aircraft Co. were due to arrive later. After a conference on Sunday Sir Miles Thomas announced that scheduled Comet services would continue.

The aircraft was commanded by Capt. M. W. Haddon, one of B.O.A.C.'s original Comet captains. His crew consisted of 1st/Off. R. G. W. Strange, R/Off. A. S. Woods, Eng/Off. A. L. Gilmore, Steward C. W. Irwin and Stewardess P. Rawlinson. Up to the time of the accident B.O.A.C.'s eight Comets had flown 9,450 hr and carried nearly 28,000 passengers on schedules services. The total flying time for all Comets is approximately 16,000 hr.

NEW ATLANTIC FREIGHT RATES

IT is generally agreed between the airlines concerned that only a considerable reduction of the present cargo rates will enable their ambitious transatlantic air freight plans to be fully realized. It has proved difficult, however, to evolve a new rate structure which is acceptable to all the airlines, since some carriers are obviously in a better position than others to offer reduced rates; P.A.W.A., K.L.M. and Sabena have on order DC-6A all-freight aircraft which should be capable of very efficient performance in terms of cost per ton mile. When the I.A.T.A. Commodity Rates Board met in New York in February to consider new transatlantic rate structure, a Pan American executive stated that his company's attempts to introduce cuts of up to 45 per cent had been "blocked by some airlines which have not had experience with low rates for bulk shipments." He then threatened that P.A.W.A. would establish its own rates. It is believed, however, that the main dispute centred on the "break-points" rather than the actual rates and that the American airline was anxious to retain higher minimum weights per shipment than those proposed by some of its competitors. K.L.M., for example, agreed that lower rates were essential to the future prosperity of transatlantic air freighting, but were reluctant to think only in terms of bulk shipments as advocated by Pan American.

The new rates for several routes, notably those between America and the United Kingdom, are still under discussion, and the complete rate structure may not be finally determined before the I.A.T.A. Traffic Conference meets in Honolulu next November. It was announced last week, however, that over 140 new reduced rates have been agreed for the carriage of various commodities between New York and several points in Europe, including Paris, Germany, Italy, Austria and Switzerland. K.L.M. was the first airline to announce application of these rates, which take effect from Sunday, May 10th. An idea of their effect is given by the following examples: the rate per kg for clothing carried between Dusseldorf and New York has been reduced from $1 38c to $1 8c and the minimum weight-level has gone down from 100 kg to 45 kg; the rate for cutlery carried between Germany and America has not been reduced, but traffic will be encouraged by a drop in the weight-level—from 100 kg to 45 kg; minimum levels for optical products between Nuremburg and New York have not been cut, but the rate per kg has gone down from $1 44c to $1 23c.

THE AVRO "ATLANTIC"

IT is safe to predict that one of the most closely examined exhibits at the Paris Aero Show (June 26th-July 5th) will be a 1/24th scale model, with transparent fuselage, of the civil version of the Avro Vulcan jet bomber. The name "Atlantic" has been provisionally adopted for this project.

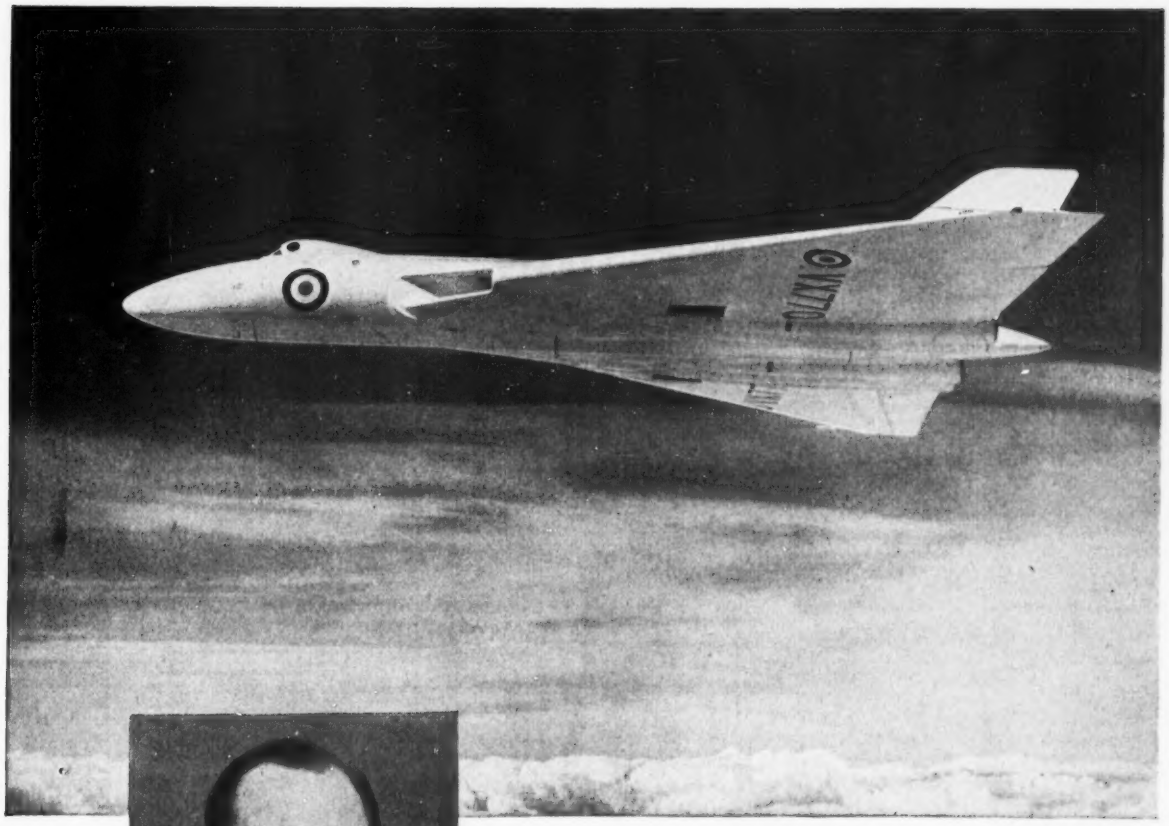
INDIAN COMET ORDER CONFIRMED

IT is officially announced by the de Havilland Aircraft Co. that Air-India International, Ltd., have decided to take up their option to buy two Series 3 Comets (not three, as previously forecast) for delivery in 1957. The order is subject to conclusion of a contract now under negotiation. The Comets will be used initially on an "express luxury service" between India and the United Kingdom.

HELICOPTER SYMPOSIUM

AT San Juan, Puerto Rico, I.A.T.A. is at present conducting its annual Technical Conference. The first part of the proceedings, a discussion on helicopter prospects by some 200 experts sent by operators, manufacturers and authorities, was completed on April 27th. Mr. J. T. Dyment, director of engineering for T.C.A., who acted as chairman, provided this summing up: "We now have a much clearer picture of what the helicopter will mean to us and the public, but just as important, we have found out what more we shall have to know . . . before we can use helicopters properly." The requirements, he said, include more powerful engines; better stability and handling for slow and hovering flight; new instruments, possibly including airborne radar for all-weather, round-the-clock operations; improved local weather forecasting, including forecasts of smoke conditions; more study of the economic aspects of potential routes which may largely determine actual helicopter specifications; and accelerated flight-testing on all new machines under simulated airline conditions to help build up the necessary experience. An overall report of the discussion is expected to be available in the near future.

LUSAKA, Northern Rhodesia, is the terminal for a recently opened B.O.A.C. tourist service from London via Rome, Cairo, Khartoum, Entebbe and Nairobi (where there is a night-stop). Hermes 56-seaters—one of which is shown here at Lusaka—complete the journey in 51 hours 15 minutes elapsed time.



The aeroplane

The Avro Vulcan. The world's first delta bomber, this four jet-engined aircraft was one of the highlights of the S.B.A.C. Show at Farnborough in September 1952, where it was demonstrated in public for the first time. Performance is still secret.

The pilot

Roland Falk, in some 6,000 flying hours, has flown more than 300 different types of aircraft. In the R.A.F. from 1939 to 1946, he was chief Test Pilot at R.A.E. Farnborough from 1943, reached the rank of Wing-Commander, gained the A.F.C. and bar. He pioneered the test flying programme of the Avro delta wing aircraft and was responsible for major development work on the Avro 707A and 707B. Awarded O.B.E., 1952. Says " if you are under the wing of Shell and BP Aviation Service, you receive the best attention possible ".

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CIVIL AVIATION . . .

IMPROVING CARIBBEAN AIRPORTS

ACCORDING to a report from Nassau last week, the Bahamas House of Assembly has agreed to pay Britain £160,000 for two airfields—Oakes Field and Windsor Field—built by the Air Ministry with American assistance during the war. Oakes has been used as a civil airport since the war, but it is now planned to sell the surrounding land and use the money for the restoration of Windsor Field. The agreement provides that, unless Windsor is made suitable for Comet operations (B.O.A.C.'s long-term plans include the introduction of jet airline services between New York, the Bahamas and Jamaica) within a certain period, the airfield will revert to Air Ministry control. During a recent visit to the Bahamas, Sir Miles Thomas spoke in favour of Windsor, which he described as better able to meet the future requirements of all operators; inconvenience due to noise would also be reduced.

Plans for improving airport facilities in Jamaica have also been announced. A new runway capable of handling Stratocruisers will be laid at Palisadoes Airport near Kingston. Twenty-four hour traffic control and other facilities will be introduced at Montego Bay Airport, which is already capable of accommodating these aircraft.

APPLICATIONS APPROVED

CONDITIONAL approval has been granted by the Minister of Civil Aviation to several operators who have applied to operate scheduled air services. Details of operators, routes and the periods covered by the approvals are as follows:—

Lancashire Aircraft Corporation: Blackpool-Isle of Man and Birmingham-Isle of Man until December 31st, 1959.

East Anglian Flying Services: Portsmouth-Shoreham-Paris for seven years.

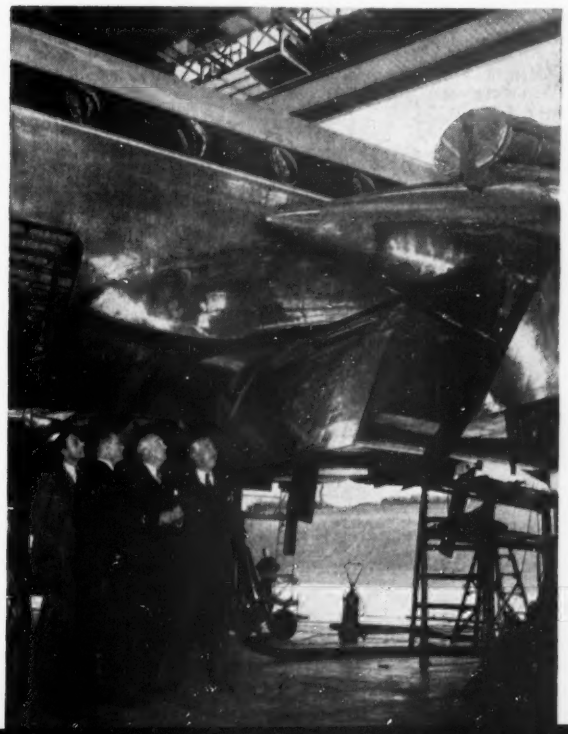
Airwork, Ltd.: London-Aden *via* Malta and Cairo (technical stops only) until December 31st, 1960; all-freight services from London to Frankfurt, Hamburg and Zurich; a series of twelve flights between London and Bulawayo on behalf of the committee of the Central Africa Rhodes Centenary Exhibition from May 26th to August 28th, 1953, inclusive.

B.O.A.C.: London-Beirut *via* Geneva/Dusseldorf/Frankfurt, Rome and Nicosia (technical stop only) until March 31st, 1960.

Don Everall (Aviation), Ltd.: Birmingham-London with optional traffic stops at Wolverhampton and Coventry for a trial period ending October 18th, 1953.

B.E.A.: Insertion of traffic stop at Birmingham on certain of their services between London, Edinburgh and Glasgow for a trial period ending October 18th, 1953.

In addition, B.O.A.C. have been authorised to insert the following alternative stops on some of their reserved routes: Geneva instead of Zurich on the Tokyo route; Dusseldorf instead of Frankfurt on the Hong Kong route; Geneva and Zurich instead of Frankfurt on the Singapore route; Geneva and Dusseldorf instead of Frankfurt on the Baghdad route. B.O.A.C. have also been authorized to call at Aden on one of their weekly return services to Nairobi.



OVERSHADOWED by the prototype Britannia (whose great size, incidentally, is particularly apparent in this view) are four of the men concerned in its production and operation: Mr. Brian Davidson (Bristol commercial director), Mr. A. E. Russell (director and chief designer), Sir Miles Thomas (B.O.A.C. chairman) and Mr. C. F. Uwins (aircraft division director). Points of interest shown are the new jet-pipe layout, part of the very efficient flaps and the curved panes of the circular cabin-windows (double panes are fitted, each of which could withstand the full cabin pressure if the other failed).

G.A.P.A.N.—MASTER'S REPORT

AT Londonderry House recently, the Master of the Guild of Air Pilots and Air Navigators of the British Empire, Mr. John Lankester Parker, delivered his annual report, mentioning in his introduction that this was the second time that he personally had given the report, and that it was the 23rd year of the Guild's existence. The Master went on to say that a large part of the future greatness of so far-flung a Commonwealth of nations must depend upon the efficiency and courage of its mercantile air fleets. Briefly, the Guild was founded to enable members of this new profession of mercantile airmen to co-operate for the purpose of raising the standard of knowledge, the promotion of honourable practice, and to advance the interests of the profession and aviation; and also to look after those, or dependents of those, who fell by the wayside or became victims of the inevitable hazards facing any new science. The Guild's goals were all sought without any regard to popularity, party politics, or trade unionism, and it was not influenced by ministries or industrial considerations. In no circumstances were any part of the funds used as profit to members.

Since the previous master's address, Her Majesty the Queen had graciously bestowed her patronage on the Guild, which was thus assured of her continuing interest. H.R.H. the Duke of Edinburgh had accepted the invitation to become Grand Master in succession to Princess Elizabeth, who found it necessary to relinquish the position on her accession. (Later it was announced that the new Master is Senior Captain D. H. Brice.)

During a busy year there had been a grand total of 77 meetings in which the Guild was concerned, either through the Court or its 11 sub-committees. The committees and their chairmen were: General Purposes and Finance (the Master); Airline Pilot and Navigation (Capt. N. C. Green); Grading (Sgt. K. S. F. Dossett); Air Safety (G/C. P. W. S. Bulman); Journal (Hon Editor, C. A. Nepean Bishop); Benevolent Fund (G/C. P. W. S. Bulman); Panel of Examiners (W/C. C. A. Pike); Test Pilot Section (S/L. F. Murphy); Education Fund (G/C. W. N. Cumming); Master Air Pilot Certificates Awards (W. E. P. Johnson); Training of Future Merchant Air Officers (J. Lankester Parker). In addition, there was the advice bureau concerned primarily with employment and run by the secretary, Major Cordes.

Among the Master's comments on the work of these sub-committees were the following: The panel of examiners primarily concerned with the issue of instructors' certificates of competency and with the carrying out of practical flying and theoretical examinations, had in the year issued 118 new certificates, an increase of 49; twenty-three instructors had been re-tested or up-graded to full competency and there had been 323 renewals—20 more than last year. The Test Pilot Committee had met at various places other than London, including Hucknall and Luton.

The Master Pilot Committee had been set up to formulate the details and sift the evidence for the award of Master Pilot Certificates to those pilots who by their long experience and proved ability are deserving of this honour. This is no new idea. Before the war the Guild instituted a Master Instructor Diploma, and the Air Ministry issued the Master Pilot Certificate. Both ceased during the war, and the Court had come to the conclusion (and in that they had the full blessing of the M.C.A.) that the time was ripe for a modified version to be re-instituted. It was thought proper to have as chairman someone independent of the Court, and they had been fortunate to secure the services of Mr. W. E. P. Johnson, who had been the moving spirit behind the institution of the Instructor's Certificate. The award was not limited in any way to members of the Guild.

The last committee to be set up was known as the T.O.M.A.O. (training of future merchant air officers). The problem of how the future demand for civil pilots was to be met was causing the Court the very gravest concern, and so a small but strong and representative body had been briefed to investigate the matter very broadly and in great detail and to make constructive recommendations at the earliest possible moment. Already this committee had met three times and was making rapid progress.

Regarding the Guild's hopes of becoming a City livery company, the Master said that he personally felt that the great day when the Guild would receive livery was not far off.

The 24th installation ceremony would be held on October 22nd next—by the kindness of the Grocers' Company, at their City Hall. This would be a great occasion, as the Grand Master, the Duke of

CIVIL AVIATION . . .

Edinburgh, would be formally installed in his office. Two new wardens, G/C. Cumming and Capt. J. C. Harrington, had been elected at the last Court meeting.

After the installation ceremony, the three trophies which the Guild can award annually would be formally presented. The Johnston Memorial Trophy has been awarded to the captains and crew of the aircraft Aries, to be received on their behalf by G/C. McKinley, who was one of the captains. The Cumberbatch Trophy has been awarded to Professor Calvert for his contribution to airfield approach lighting. The Brackley Memorial Trophy has been awarded to Mr. Geoffrey Tyson in recognition of his work in connection with the Princess flying-boat.

The Master then referred to a new annual award to be called the Derry and Richards Memorial Medal (as announced on page 569). It would commemorate two gallant gentlemen who lost their lives last year, and would be in the form of a medal to be retained by the recipients and to be awarded to the person who, in the view of the Guild, carried out the most meritorious experimental flying each year. It had been made possible by the generosity of the de Havilland company and of their employees.

Before making his final important announcement, regarding the election of the new master, Mr. Lankester Parker referred to some generous donations to the Guild from the aircraft industry and from individuals—in particular, a Christmas present of £100 from Sir Francis McClean, Honorary Warden—and to the promise by Mr. Oswald Short, Honorary Warden, to present the Guild with the Grand Master's Badge of Office, "of the best materials and of the highest workmanship, befitting its Royal wearer."

The Master concluded, "It gives me real pleasure to announce that your new master for the year 1953-54 is Senior Captain David Allen Brice, of the North Atlantic Flight, B.O.A.C."

BREVITIES

THE Minister of Civil Aviation, Mr. A. T. Lennox-Boyd, will officially open B.E.A.'s new Waterloo Air Terminal at 10.30 a.m. on Thursday, May 21st.

* * *

The French independent airline T.A.I. has taken delivery of the first of three DC-6Bs for service between Paris and Dakar, French Equatorial Africa, Madagascar and Saigon.

* * *

Development plans for Sutton Coldfield include a provisional site for a rotorstation, the site of which is reported to have been tentatively approved by B.E.A.

* * *

The value of transactions handled by the I.A.T.A. Clearing House during February was £5,513,000 compared with £5,333,000 during the corresponding month last year.

* * *

On behalf of the United Kingdom, Sir Frederick Tymms signed the 1952 Rome Convention at I.C.A.O. headquarters in Montreal on April 23rd. Nineteen states have now signed the convention, which specifies the rules and the limits of liability in the case of an aircraft causing death or personal injury or damage to property in foreign territory.

* * *

An M.C.A. order has prohibited civil aircraft from flying under 11,000ft within five nautical miles of Buckingham Palace between the hours of 7 a.m. and 7 p.m. (B.S.T.) on Coronation Day, June 2nd. Civil aircraft flying outside this area but within the London Control Zone will be permitted to do so only under Instrument Flight Rules.

* * *

M.C.A. Information Circular No. 40/1953 announces that, for economy reasons, records of R/T. messages on U.K. control frequencies will normally be retained for 30 days only. It is therefore requested that any complaint or report which might necessitate the retention of records be lodged within 21 days of the incident concerned.

* * *

According to a report from Tokyo, Japan Air Lines, who have already ordered two Comets, are considering the purchase of Britannias for future long-range operations.

* * *

Mr. James A. Rockefeller, director of several American companies, including the National City Bank of New York, the National City Safe Deposit Company and the International Banking Corporation, was recently appointed to the board of P.A.W.A.

* * *

The procedure for inspecting Fairey Reed fixed-pitch airscrews fitted to Cheetah engines is described in a new *Notice to Licensed Engineers and to Owners of Civil Aircraft* (Notice No. 13, issue No. 4), published by the A.R.B.

* * *

Pilots intending to fly helicopters either privately or commercially are invited by the M.C.A. to apply to the following address for the latest information on licensing requirements: The Secretary, Ministry of Civil Aviation, T.L.1(a), Ariel House, Theobalds Road, London, W.C.1.

* * *

The M.C.A. announces that the May 19th examination for the Commercial Pilot's Licence and Instrument Rating will be held at the London Centre and at Perth Aerodrome, Scotland (Tel.: Scone 295). Candidates wishing to take the examination in Scotland should address their applications to the M.C.A. in the normal manner, but mark them "Scotland."

* * *

Transport movements at United Kingdom airports in March, 1953, were 5 per cent more than in the corresponding month of last year. The number of movements was 12,100 and the total of passengers handled was 189,600 (a 30 per cent increase); the freight figure went up by 33.5 per cent to 3,870 short tons, but mail decreased slightly to 1,110 tons. Fractional increases were reported in the number of movements at London and Northolt Airports, but passenger traffic expanded considerably—respectively, by 19 per cent and 26 per cent.

* * *

Mr. Dennis Handover, who had been chairman of S.A.S., Ltd., since its formation in 1948, has resigned his chairmanship and is succeeded by Mr. Peter Lind. This step has been taken in conformity with the procedure followed by the main board of the S.A.S. Consortium in Scandinavia, by which the office of chairman is held in rotation by Swedish, Norwegian and Danish representatives (Mr. Kampmann, a Dane, is chairman of the main board, and Mr. Lind is the British director nominated by the Danish interests). Mr. Handover retains his seat on the board of S.A.S., Ltd.

CONVERTED TO CARGO: (Left) High-power lighting equipment, urgently required in Kenya for use against Mau Mau terrorists, goes aboard a Tudor of William Dempster, Ltd., at Stanstead; Lep Air Services arranged the charter. Large freight doors have been fitted to the Air France Languedoc, shown (right) being loaded with fruit. Such a modification would obviously be very useful, though expensive, in the case of the Tudor.

SERVICE AVIATION

Royal Air Force and Naval Aviation News

Queen Mother at R.Aux.A.F. Ball

IT has been announced that Queen Elizabeth the Queen Mother has accepted an invitation to attend the Royal Auxiliary Air Force Officers' Coronation dinner and ball at the Savoy Hotel on May 29th. The Queen Mother is the Honorary Air Commodore of No. 600 (City of London) Squadron, R.Aux.A.F.

Harvard Bombers

A REPORT from Nairobi states that on April 30th the Royal Air Force took part for the first time in the campaign against Mau Mau activities, when three Harvards attacked a suspected hide-out in the Aberdare mountains. The Harvards each dropped eight 20 lb bombs and machine-gunned the target area, which was at an altitude of 10,000ft.

Korean Honours

BOTH R.A.F. and Army personnel appear in a recently published special Korean honours list. The period covered is from July 1st to December 31st, 1952.

The D.S.O. is awarded to Major J .M. H. Hailes, R.A., who has been in command of an Independent A.O.P. flight since last July. He joined the flight at a time when enemy resistance was considerable, but by inspired leadership, efficiency and courage "his magnificent example" (to quote from the citation) "was a great inspiration to the more experienced pilots and filled the younger ones with unshakeable confidence." He has personally flown 125 sorties and conducted 166 shoots with the Divisional and Corps artillery.

F/L. V. Bergman, R.A.F., who has received the award of a Bar to the D.F.C. is a Czechoslovakian by birth and has commanded the Flying Boat Wing Detachment at Iwakuni for two periods during the past year. Out of a total of 3,770 hours flown, 506 have been on operations in Korea.

For his work as a navigator on maritime reconnaissance operations, F/O. R. M. Lee, R.A.F., is awarded the D.F.C. Altogether he has flown over 800 hours on Korean operations and during the period under review flew 323 hours in 23 sorties.

Two other awards of the Distinguished Flying Cross are to officers of the Royal Regiment of Artillery, who are both pilots in A.O.P. flights. They are Capt. G. W. C. Joyce, who has controlled 210 shoots and who consistently volunteered to try out new fly-lines and to do low-level photographic work over enemy territory, and Capt. J. A. Crawshaw, who has controlled no fewer than 300 artillery shoots. The citation states that on one occasion Capt. Crawshaw "was engaging an enemy gun position which was causing casualties to our own troops when he, in turn, was engaged by light anti-aircraft fire. In spite of the fact that his aircraft had been hit, he persisted in remaining in the area until he had finished dealing with the guns."

An air gunner on Sunderland flying-boats, F/Sgt. J. M. Reilly, has been awarded the D.F.M. for his service in operations over Korean waters during the past two years, during which period he has participated in 72 operational sorties.

Sgt. R. W. Carr, an n.c.o. in charge of ground crew, receives the B.E.M. for his keen and conscientious work and the following are Mentioned in Despatches: S/L. P. F. Eames, F/L. L. C. Swalwell, F/L. R. Craig, D.F.C., F/O. R. P. H. Rose, F/O. T. P. O'Brien, M.Gnr. W. Sanderson, F/Sgt. P. E. D'Santos, F/Sgt. A. Ibbotson, F/Sgt. W. I. Tedman, Sgt. J. A. Lever, Sgt. D. M. Dodge, Sgt. F. McK. Cunningham, Sgt. J. P. Killelea, R.I.F., and Sen. A/C. W. A. Gorringe.

Sabre and Mig

THE following comments are extracts from a report by W/C. J. H. R. Merifield, D.S.O., D.F.C., who was selected with F/Ls. A. Jenkins, J. Nicholls and D. Dunlop, also from Fighter Command, to fly a tour of duty with American Sabre Wings in Korea. The party left Britain in April last year and spent the first six weeks at an O.T.U. in Nevada, U.S.A.

On the characteristics of the Sabre W/C. Merifield comments: "We found it a delightful aeroplane to fly. It has no vices and practically no flying limitations. It will go through what is popularly called the sound barrier with no trouble, and the controls, which are power-operated, are beautifully balanced at all speeds."

After describing how the small differences in operational procedure were overcome and how political and territorial considerations prevented United Nations' aircraft from passing over the Yalu River, the Wing Commander's report goes on: "So what we do is to patrol south of the Yalu River at heights ranging from 45,000ft downwards and wait for them to come across.

"The Migs have considerable advantages over us at this point. They are operating over their own territory and close to their own bases. They have an efficient radar warning system. We on the other hand are two hundred miles from our bases and at this range can get very little help from our own radar. We have to keep always enough fuel in reserve to engage in combat, which means operating at full power with very heavy fuel consumption, and then to take us back home with enough in hand to cope with any unforeseen delays in landing.

"The Mig-15, too, is in many ways a better fighter than the Sabre. It is faster, has better acceleration, climbs faster and has a higher ceiling. They can climb to their best height in perfect safety north of the Yalu and attack us at any time they choose from the quarter most favourable to them. In spite of all this we are still knocking them down at a ratio of better than eleven to one in our favour."

Another interesting sidelight in the report deals with the fore-and-aft stability of the Mig-15. "When the Mig pilot tightens up his turn a bit too enthusiastically his aircraft is liable to snap-roll and spin, and there have been several cases observed of Migs spinning into the ground without having been hit at all. There is no doubt, though, that the enemy pilots on the whole are benefiting from their encounter with us, and unless the performance of the Sabre is considerably improved or a new type introduced, the tide could turn in the enemy's favour."

A final comment in the report deals not with the Sabre or the Mig but with the air rescue service. "When operations are going on," W/C. Merifield says, "helicopter and amphibian aircraft are at readiness to go to the help of anyone in trouble and, in addition, flights of fighters are normally airborne in order to deal with any enemy interference with rescue operations. I have seen a helicopter waiting underneath a member of my flight descending by parachute more than 100 miles north of our base. In this case he came down in the sea and spent approximately 30 seconds in the water. The helicopter pilots are held in the highest esteem."

APPRECIATIVE AUDIENCE: Air Marshal Sir Basil Embry, until recently A.O.C-in-C. Fighter Command, is now visiting Australia and New Zealand. He is seen demonstrating the points of a Vickers-Armstrongs' Swift to cadets of the R.A.A.F. College at Point Cook. On his retirement from the Royal Air Force Sir Basil intends to settle in New Zealand.

Coronation Naval Review

THE aircraft carriers taking part in the Coronation Naval Review at Spithead on June 15th are: H.M.S. *Eagle* (flagship of Vice-Admiral J. Hughes-Hallett, C.B., D.S.O., Flag Officer, Heavy Squadron, Home Fleet), *Illustrious*, *Implacable* (flagship of Vice-Admiral J. F. Stevens, C.B., C.B.E., Flag Officer Training Squadron), *Indefatigable*, *Indomitable*, *Perseus*, *Theseus*, H.M.C.S. *Magnificent* (flying the broad pendant of Commodore H. S. Rayner, D.S.C., C.D., R.C.N.), and H.M.A.S. *Sydney*. The first five are all of the fleet type and the remaining four are of the light-fleet type.

Other ships of aeronautical interest are the aircraft direction vessel H.M.S. *Boxer* and the aircraft tender H.M.S. *Blackburn*.

About 300 naval aircraft will take part in the fly-past, which is being led by Rear-Admiral W. T. Couchman, D.S.O., O.B.E., Flag Officer Flying Training, in the Vampire of the Admiral's Flight. Eight Dragonfly helicopters are being flown by No. 705 Squadron and 18 squadrons are each sending eight Fireflies. Three of these units are

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from the R.N.V.R. and one is Australian. Sixteen Seafires will appear, eight each from No. 766A and No. 1833 Squadrons. No. 849 will provide eight Skyraiders, and 56 Sea Furies will come from seven naval fighter squadrons—three R.N., three R.N.V.R. and one Canadian. Eight two-seater Sea Hornets from No. 809 will be there and 16 Avengers—eight each British and Canadian.

The faster and more modern aircraft come towards the end. There will be three Gannets and eight each of Vampires and Meteors. Nos. 736, 800, and 803 are each providing eight Attackers and No. 806 the same number of Sea Hawks. There will, in addition, be a number of prototype fighters.

The programme for the day is as follows : At 1500 hr H.M.S. *Surprise*, preceded by the Trinity House vessel *Patricia*, and escorted by H.M.S. *Redpole* (acting as the Admiralty Yacht) will leave the south railway jetty for Spithead. As the *Surprise* approaches, saluting ships of the Fleet will fire a royal salute of 21 guns.

At 1530 hr H.M.S. *Surprise* will enter the review lines and Her Majesty the Queen will review the Fleet.

At about 1710 hr H.M.S. *Surprise* will anchor at the head of "E" line, and at 1735 the fly-past by naval aircraft will take place. Later, the Queen will dine on board H.M.S. *Vanguard*, and from 2230 to midnight the Fleet will be illuminated, with a firework display from 2250 to 2300.

The Last Spitfire

AT a ceremonial parade on Thursday of last week, at Singapore, Air Marshal Sir Alfred Clifford Sanderson, A.O.C-in-C., F.E.A.F., presented a silver model of a Supermarine Spitfire to No. 60 Squadron, R.A.F., which was the last unit to fly Spitfires on operations. The final sortie was against targets in the Kota Tinggi area of Johore, on January 1st, 1951.

The model, which was accepted by the commanding officer, S/L. W. H. Mills, stands 18in high and was presented jointly by Vickers-Armstrongs, Ltd., and Rolls-Royce, Ltd. No. 60 is now flying Vampires.

C.F.S in Middle East

HEADED by W/C. D. G. Lyster, D.S.O., D.F.C., A.F.C., who commands the Examining Wing of the Central Flying School, a team of nine members of the Wing left Little Rissington on April 27th for the Middle East.

Travelling in a Valetta, the team will visit R.A.F. units in Malta, Cyprus, Aden, Iraq and Egypt and are expected to return to Britain on May 21st.

The purpose of the tour is to check instrument flying and to discuss piloting technique. This, it is felt, will help to ensure that all new ideas in operational flying are fed back to the Central Flying School so that flying instruction never falls behind operational developments.

DAWN PATROL: A Vampire of No. 78 Fighter Wing, Royal Australian Air Force, starts up in the half-light of early morning for an attack on the Suez Canal defences during exercise "Session."

Jets for University Squadrons ?

AT the recent annual dinner of the Manchester University Air Squadron, A.V-M. T. N. McEvoy, Assistant C.A.S. (Training), was asked if he knew when the squadron would be re-equipped with jet trainers. He was non-commital in his reply, but recalled that Air Marshal H. T. Lydford, A.O.C-in-C. Home Command, had previously said, when proposing the toast of "The Squadron," that the University Air Squadrons were getting *a Harvard or two in the meantime.*

S/L. J. T. Collyer, the commanding officer, gave a brief outline of the unit's activities during the past 12 months. He said that an encouraging proportion of those who had left, had entered the R.A.F. on regular commission, in addition to those who had entered for National Service only or had joined the R.Aux.A.F.

PAST AND PRESENT: Some of the commanding officers of No. 1 Squadron who assembled at Tangmere for the recent presentation of the Sovereign's Standard: G/C. E. O. Grenfell, W/C. H. R. Allen, A.V-M. T. N. McEvoy, A. Cdre. R. W. Chappell, S/L. R. B. Morison (the present C.O.), A.V-M. Sir Charles Longcroft and Air Chief Marshal Sir Philip Joubert.

"Flight" photograph

G.U.A.S. Chapel Window

TO perpetuate the relationship of the Glasgow University Air Squadron with the University of Glasgow, a sum of £1,500 is being raised to install a stained-glass window in the University chapel. W/C. M. Bunce, the commanding officer, would be pleased to receive contributions from past and present members, and from any other persons who would like to associate themselves with the project.

H.M.A.S. "Sydney"

ON Anzac Day (April 25th) the Australian carrier *Sydney* entered Grand Harbour, Malta, for a short stay on her way to Britain for the Coronation Review. A memorial service held in the ship was attended by His Excellency the Governor of Malta, senior officers of the Services and representatives of No. 78 Wing, R.A.A.F., stationed at the R.N. Air Station Hal Far.

A day's exercises with H.M.S. *Indomitable* and other ships were carried out before proceeding to Gibraltar en route for Portsmouth, where the Australian vessel was due to berth last Wednesday.

The Australian Coronation contingent on board *Sydney* numbers 240, and includes four holders of the Victoria Cross and four of the George Cross.

No. 79 Squadron

HAVING now been re-formed for some while, No. 79 Squadron wishes to contact past members of the unit. The squadron tie has been redesigned with black and gold diagonal stripes, the black salamander and red flares being superimposed on the gold. These ties may be obtained direct from the squadron, c/o Information Division, Air Ministry, Whitehall Gardens, London, S.W.1.

Reunion

AGAIN, the annual re-union of No. 619 Squadron is to be held at the Magpie and Stump in the Old Bailey, London, with G/C. Birch in the chair. The date of the gathering is May 16th and particulars may be obtained from P. S. Osborne, c/o A. R. Heathcote and Co., Ltd., Bernard Works, Sylvester Gardens, Sheffield 1.

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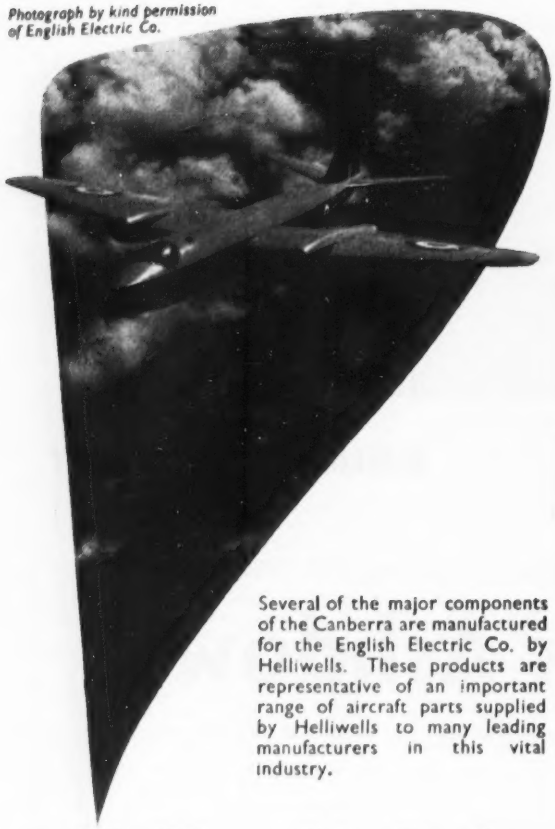

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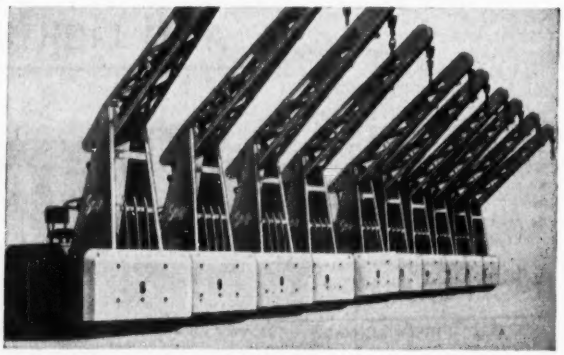

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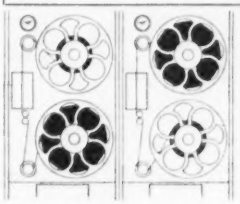

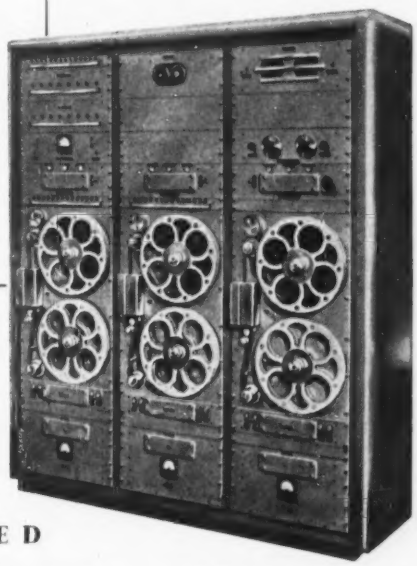

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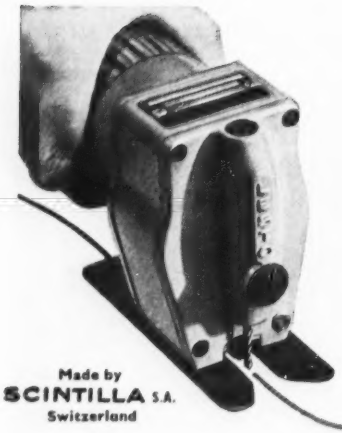

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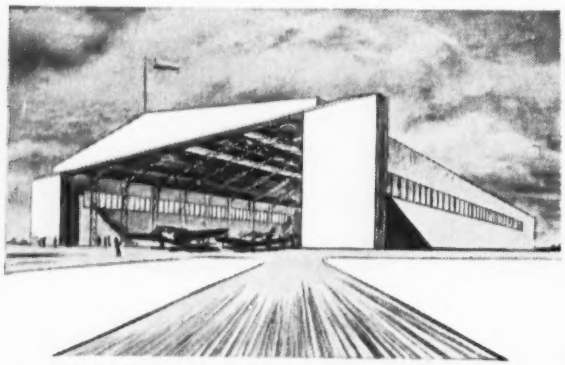

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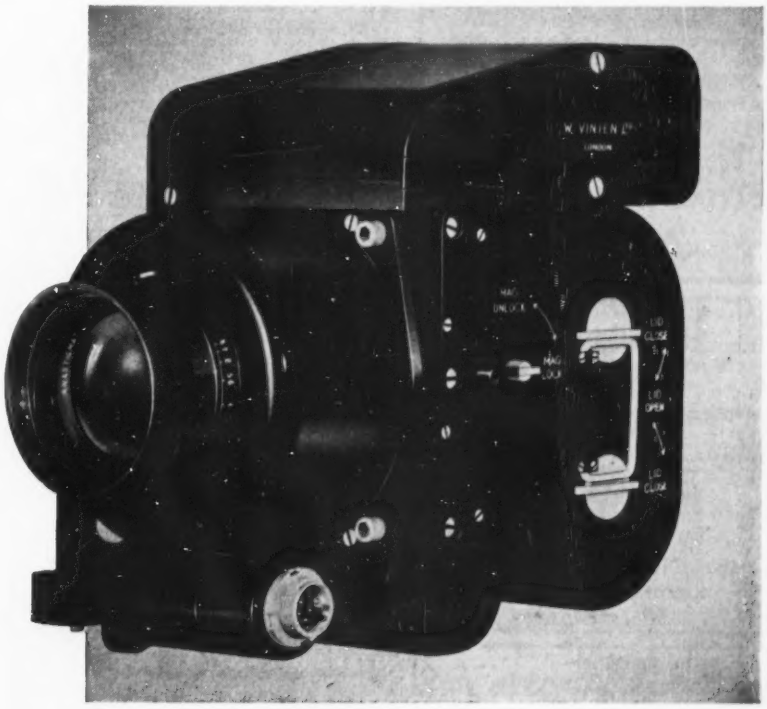

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PUBLIC ANNOUNCEMENTS

AIR TRANSPORT ADVISORY COUNCIL

THE Air Transport Advisory Council give notice that they have received the undermentioned applications to operate scheduled air services:—

APPLICATION No. 191. From Hunting Air Transport, Ltd., of 5 Fitzhardinge Street, London, W.1, for an inclusive tour air service in conjunction with the Holiday Fellowship and the Co-operative Holidays Association, to be operated with Dakota aircraft between London (Bovingdon) and Munich, at a frequency of seven return flights during period June 7th-August 30th, 1953.

APPLICATION No. 192. From Hunting Air Transport, Ltd., of 5 Fitzhardinge Street, London, W.1, for an inclusive tour air service in conjunction with the Holiday Fellowship and the Co-operative Holidays Association, to be operated with Dakota aircraft between London (Bovingdon) and Basle at a frequency of six return flights during period June 14th-August 23rd, 1953.

THESE applications will be considered by the Council under the Terms of Reference issued to them by the Minister of Civil Aviation on July 30th, 1952. Any representations or objections with regard to these applications must be made in writing, stating the reasons, and must reach the Council within 14 days of the date of this advertisement, addressed to the Secretary, Air Transport Advisory Council, 9 Buckingham Gate, London, S.W.1, from whom further details of the applications may be obtained. When an objection is made to an application by another air transport company on the grounds that they are applying to operate the route or part of route in question, their application, if not already submitted to the Council, must reach them within the period allowed for the making of representations or objections. [9565

THE College of Aeronautics. Applications are invited for the Perring Scholarship in aeronautics, valued £400 per annum, tenable at The College of Aeronautics. The successful candidate will be admitted to the two-year course at the College. Applicants should preferably be honours graduates or final year undergraduates in engineering, mathematics or physics; applications from non-graduates with comparable qualifications will also be considered. Candidates must be British subjects domiciled in the United Kingdom. Forms of application and statement of conditions will be forwarded on written application to: The Warden, The College of Aeronautics, Cranfield, Bletchley, Bucks. The closing date for the receipt of applications is June 1st, 1953 [9491

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LEARN to fly for £24; instructors' licences and instrument flying for £3 per hour; night flying £3/10/- an hour; residence 5 gns. weekly. Approved M.C.A. private pilot's licence course.—Wiltshire School of Flying, Ltd., Thruxton Aerodrome, Andover, Hants. [0253

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SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through the local office of the Ministry of Labour and National Service, etc., if the applicant is a man aged 18-64 or a woman aged 18-59 inclusive, unless he or she or the employer is excepted from the provisions of The Notification of Vacancies Order 1952.

VICKERS-ARMSTRONGS, Ltd. (Aircraft Section) have vacancies at their Hurn branch (near Bournemouths, Hants) for the following staff:—

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(aircraft experience preferable but not essential)
SENIOR AIRCRAFT ELECTRICAL DRAUGHTSMEN
AIRCRAFT STRESSMEN
SENIOR AND JUNIOR WEIGHTS ENGINEERS
(for aircraft work in Design Office)
JIG AND TOOL DRAUGHTSMEN

APPLY, in writing, to the Employment Manager, Vickers-Armstrongs, Ltd. (Aircraft Section), Weybridge, Surrey.

APPLICATIONS, with certain exceptions, are subject to the approval of the Ministry of Labour and National Service. [0576

AIRWORTHINESS engineers. The Bristol Aeroplane Company Limited have vacancies in their Aircraft Design Office at Filton for

TECHNICAL ASSISTANTS
AS ASSISTANT AIRWORTHINESS ENGINEERS

QUALIFICATIONS required are general design experience of aircraft components and systems. Familiarity with Air Registration Board requirements is an advantage.

SALARIES, working conditions and prospects of promotion on merit are excellent.—Applications, giving details of experience and qualifications, should be addressed to the Personnel Manager, Bristol Aeroplane Co., Ltd., Aircraft Division, Filton House, Bristol. [9569

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BRITISH EUROPEAN AIRWAYS invited applications for the following vacant posts in the Project and Development Branch:—

DEVELOPMENT engineer (projects) (55/53) for work on analysis and evaluation of new projects and performance and operational analysis work on new and existing aircraft types. Qualifications: engineering or science degree, considerable experience in aircraft industry. Salary scale £875 to £1,175 p.a.

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WEIGHTS engineer (59/53) for weight control work and the preparation of loading instructions. Qualifications: engineering degree, practical engineering training experience of weight control in aircraft. Salary scale £695 to £875 p.a.

MODIFICATIONS engineer (70/53) to assist in preparing aircraft modifications. Qualifications: engineering apprenticeship, Ordinary National Certificate, considerable experience in aircraft industry with knowledge of drawing office practices. Salary scale £620 to £785 p.a.

TECHNICAL assistant (71/53) to analyse engineering data, and assist in general development work. Qualifications: Higher National Certificate, practical aircraft engineering experience. Salary scale £595 to £695 p.a.

TECHNICAL assistant (engines) (60/53) to analyse engineering data for power plant development and assist develop current power plants. Qualifications: sound aircraft engineering training, detailed knowledge of power plants. Salary scale £595 to £695 p.a.

DRAUGHTSMEN for work on development, modification and repair of modern aircraft and design of associated equipment. Qualifications: National Certificate, 2 years' workshop and 3 years' aircraft drawing office experience. Some draughtsmen will be required especially for electrical and radio work and previous experience in these fields will be necessary. Salary, age 21 £7/17/-, age 25 £10/15/- p.w. with possibility of proficiency pay in accordance with N.J.C. Agreement.

WRITTEN applications, giving title and number of post applied for, to Personnel Officer, Head Office, B.E.A., Keyline House, Ruislip, Middlesex. [9581

COMMERCIAL pilot wanted; Auster endorsement; pleasure flights and occasional charter, duration summer season.—Pine's Airways, Ltd., Blackpool Airport. [9561

HUNTING AIR TRANSPORT requires Viking and Dakota pilots with commercial, I.R. and R/T licences. Vacancies exist for senior pilots with A.L.T.P.—Write, Bovingdon Airport. [9580

AIRCRAFT maintenance mechanic, experienced American-type aircraft and engines, required for London Airport. Salary £6 15s. per week.—Full details to Box 6968. [9579

SKYWAYS of London have a limited number of vacancies for captains with York experience.—Please write or telephone full particulars to the Personnel Manager, 7, Berkeley Street, London, W.1. [9559

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LICENSED radio engineer and radio mechanics at our base at Stansted Airport, Essex.—Apply by letter or telephone to the Senior Radio Engineer, Aviation Traders, Ltd., Southend Airport, Essex. Tel.: Rochford 56491. [0950

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APPLICATIONS, in writing, should be sent to Staff Superintendent (Recruitment), London Airport, Feltham, Middlesex. [9577

AIRCRAFT or mechanical draughtsmen required, all grades.—Apply, stating age, experience and salary required, to the Chief Draughtsman, Alan Muntz and Co., Ltd., Aircraft Division, Langley Aerodrome, Slough, Bucks. [0968

TECHNICAL illustrator required, aged 23 or over, with considerable practical experience.—Applications in writing to Personnel Manager, Percival Aircraft, Ltd., Luton Airport, Beds, stating age, experience and salary required. [0593

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JIG and tool draughtsmen, fully experienced, required by Percival Aircraft, Ltd., Luton Airport, Beds. Good working conditions and full welfare facilities, including staff pension scheme.—Applications to the Personnel Manager, stating age, experience, salary required. [0600

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SKYWAYS of London invite applications from experienced air stewardesses for the position of senior stewardess for their York fleet operating from Stansted, Essex.—Applications, stating full particulars of age and experience, to be sent to the Personnel Manager, 7 Berkeley Street, W.1. [9587

APPLICATIONS are invited from senior and intermediate design draughtsmen. Experience of aero-engine design desirable, but not essential. Also checkers. —Please write, stating age, and giving details of previous experience in chronological order, to the Personnel Officer, The de Havilland Engine Co., Ltd., Stag Lane, Edgware, Middlesex. [0930

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SKYWAYS of London invite applications from qualified aircraft engineers for their vacancies for station engineers at Hamburg and Nicosia. Minimum qualifications are an "A" licence for York aircraft and a "C" licence for Merlin engines.—Applications, stating full particulars of age, qualifications and experience, to be sent to the Personnel Manager, 7 Berkeley Street, W.1. [9586

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APPLICATIONS are invited from design draughtsmen and stressmen, also technical assistants with combined design and performance experience for work on both reciprocating and gas turbine aero engines.—Applicants should state full particulars of experience and qualifications and should be addressed to the Personnel Officer, The de Havilland Engine Co., Ltd., Stag Lane, Edgware, Middlesex. [0692

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ARMSTRONG SIDDELEY MOTORS require senior engine designer, aged 30-36 years, for work of exceptional interest on an entirely new design project offering wide scope for imagination and inventiveness. Applicants must be first-class works trained mechanical designers with at least Higher National Certificate and a thorough knowledge of high speed I.C. engine design.—Reply, in detail, to Reference HSR.1, Personnel Manager, Armstrong Siddeley Motors, Coventry. [9542

ARMSTRONG SIDDELEY require a first-class mechanical designer, aged 28-32, for the project design office. Applicants must be works trained designers with at least Higher National Certificate and a sound background experience of aero engine design. The position offered is one of great interest and is an exceptional opportunity for a young engine designer to expand his experience in the gas turbine industry.—Reply, in detail, to Reference HSR.3, Personnel Manager, Armstrong Siddeley Motors, Coventry. [9543

AIRCRAFT engineers. The West African Airways Corporation have a few vacancies for engineers at their base in Lagos, Nigeria. Appointments are to the permanent staff in the salary range £630 to £1,070 p.a. Salaries are incremental and there is a pension scheme. Starting salaries will be determined by qualifications and experience. Candidates should be not more than 35 years of age and must possess either "A" or "C" Licences covering either Dove, Wayfarer or Marathon aircraft. The minimum starting salary for candidates holding both "A" and "C" Licences is £920 p.a. Free furnished quarters are provided and also free passages for the selected candidates, their wives and children. Tours of duty are from 18 to 24 months and leave on full pay is granted at the rate of six days for each completed month of residential service. Income tax is substantially lower than in the U.K.—Applications should be made to the Corporation's agents in the U.K., the British Overseas Airways Corporation, Room 105, Airways House, Great West Road, Brentford, Middlesex. [9668

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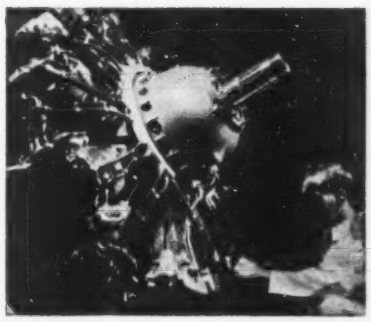

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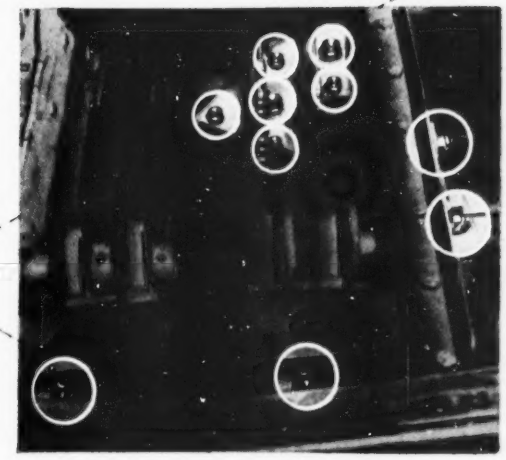

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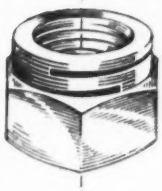

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